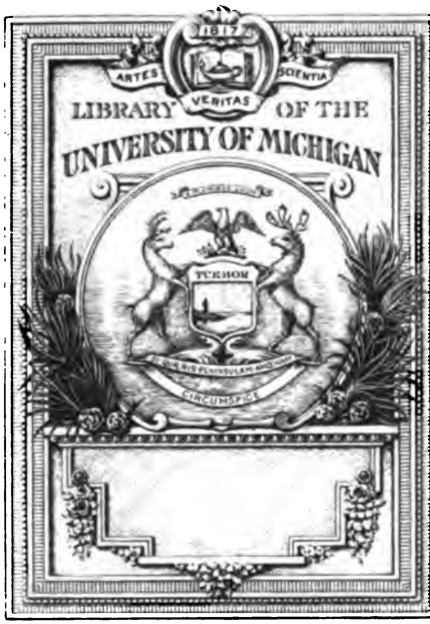
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The American Annual of Photography 1923

VOLUME XXXVII

Edited by Percy Y. Howe

NEW YORK
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A GLIMPSE OF WAUKON CREEK. Lou Sweet.

PREFACE

THE remarkable development of photography during the last decade demonstrates conclusively what a factor it has become in the advance of our civilization. While it is a fascinating hobby to thousands of amateurs, it is in commercial circles that the photographic plant has become a necessary part of their equipment.

The past year has not produced any remarkable improvement in photographic materials or methods, but there has been evidence of an awakening interest in pictorial photography, as seen in the increased quantity and number of Camera Clubs and Exhibitions.

A larger number of prints were received by us than ever before, and we regret that space did not permit of our reproducing more. We wish, however, to express our sincere thanks to all our good friends who in any way assisted us in the making of this volume.

Manuscripts, or prints, to be submitted for the 1924 volume should be sent to 422 Park Hill Avenue, Yonkers, New York, so as to reach us before August 1st, 1923.

PERCY Y. HOWE, Editor.

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William Shewell Ellis.

The American Annual of Photography · · 1923

PHOTOGRAPHIC REVIEW OF 1922

By CARROL B. NEBLETTE

IN order that the immense amount of work which is now being done on the theory and practice of photography be of service and easily accessible, a catalogue of photographic literature must be started. It is a healthy sign for future progress that the Royal Photographic Society of Great Britain last year began the publication of *Photographic Abstracts* for the express purpose of classifying and recording the progress of photography. At the same time the *La Revue Française de Photographie* began to issue monthly a bibliographical summary of photographic investigation. In this country the Eastman Research Laboratory has for seven years issued for the personal use of its members the *Abstract Bulletin*. Really serious workers who desire to keep in touch with the advance of photography as a science should take one of these publications.

In this connection, mention should also be made of the *Photographic Review* contributed to the pages of *American Photography* by E. J. Wall, F.R.P.S.

The following pages have been written in an attempt to summarize in concise and handy form the more important investigations, inventions, and progress of the year. The author realizes that it is by no means complete. If a complete summary of photographic progress had been attempted perhaps the whole volume might have been required, and a great deal of this would have been of little interest or value to the average worker.

NEW INTRODUCTIONS

During the year a new magazine *"Camera"* published by A. J. Bucher of Lucerne, Switzerland, has made its appearance. The new magazine, which is in German, contains eight art pages in rotogravure each month, and also scientific communications by leading authorities as Luppo-Cramer, Konig, etc.

The firm of Dallmeyer has introduced an ultra speed anastigmat working at F/2.9 called the Pentac. The front component consists of a bi-convex crown glass of high refractive index and low dispersion cemented to a negative lens of flint glass of lower refractive index. The mid-negative element is biconcave, and is of flint glass of a lower refractive index than the crown with a dispersion at least equal to that of the other flint glasses. The back element is similar to the front only reversed in position. *Eng. Patent* 151,506.

Paul Rudolph, the designer of the famous Tessar, has calculated an objective which is marketed by Carl Zeiss as the Plasmat. (*Eng. Pat.* 161,091.) Rudolph has claimed greater depth of focus for the same than given by other lenses of similar focal length and aperture, but measurements by W. Zschokke (designer of the Goerz Dagmar) show that the apparent depth is due to chromatic aberration incompletely corrected.

Photo. Ind. 1921, *Mar.* 30, *p.* 343.

Taylor, Taylor and Hobson have patented an improved form of the Gauss lens, working at F/2, consisting of six components, two of which are collective lenses of dense barium crown, and two compound dispersive components of plano-concave flint cemented to a plano convex lens of barium crown with high refractive index. *Eng. Patent* 157,040, 1920.

The same firm has also patented a modified form of the original Cooke lens working at F 7/7 which permits of simpler construction, while giving good performance at its opening.

Eng. Pat. 157,037, 1920.

The firm of Dallmeyer have introduced the Dallon telephoto anastigmat working at F 5/6, and giving a magnification of two times. It may be used on all kinds of cameras, even roll film, and will certainly fill a long felt want for the sport, or naturalist photographer. The prices are remarkably reasonable considering the difficulty of producing lenses of this type.

WINTER SHADOWS. LOU SWEET.

The firms of Goerz, Zeiss, and others have not been idle, but as their latest introductions have not yet been introduced in this country, I will not take up space with them.

Several new lenses of the soft focus type have been introduced, namely the Bausch & Lomb Plastigmat, the Gundlach Hyperion, the Wolfe Artistic, by Pinkham Smith, the Graf Variable and a modified Verito. It seems like every manufacturer must try his hand at one, and see what he can do. Some of the latest introductions without doubt are superior in many respects to the older ones but a great deal depends on the user, and I have no doubt that many of us older workers will get better results with the old lens to which we are accustomed, than with the newer ones.

Among very fast lenses introduced in this country we should mention the Gundlach Ultrastigmat working at F/1.9 made exclusively for motion picture cameras. The Gundlach-Manhattan Optical Co., manufacturers of the famous Turner-Reich lens, have put out their Radiar which is an unsymmetrical anastigmat working at F/4.5.

In a paper read by Hermann Kellner at the Boston meeting of the Society of Motion Picture Engineers, in May, 1922, is described a new fast lens, designed especially for motion picture work by the Scientific Bureau of the Bausch & Lomb Optical Company. This lens is an F/2 triplet. In spite of this enormous aperture the spherical aberration is corrected as well as in the usual F/3 lenses, coma correction excellent and the astigmatism corrected for a field of 30 degrees. This result was obtained by making one of the six surfaces parabolic. The lens represents probably the first successful effort to employ such a surface in a photographic lens.

SENSITOMETRY AND PHOTOMETRY

In a paper before the Royal Photographic Society of Great Britain, Higson describes in detail a method of automatically obtaining the characteristic curve by wedge methods. The plate whose curve is to be found is exposed under the wedge and developed. When dry it is placed at right angles to its original position on the wedge and printed on vigorous gaslight paper. The general shape and character of the curve is shown very well, but the outline is very diffused.

Photo. Journ., Feb. 1921, *p.* 93.

THE COQUETTE. ETHEL STANDIFORD-MEHLING.

In an endeavor to explain the principles of sensitometry in a popular manner the editor of the British Journal, Mr. George E. Brown, contributed to that publication an interesting series of articles entitled "The H. & D. Doctrine." Density, opacity and transparency are explained very simply, and the law of constant-density ratios, the characteristic curve, inertia, and gamma treated in a readable yet accurate manner. The papers are a very valuable addition to the literature of the subject.

Brit. Journ. P., pp. 335, 354, 372, 286, 401, 415.

During the year Dr. Eder, of Vienna, has introduced a modified form of the Eder-Hecht Photometer having a double scale. It is a modified form of exposure plate similar to the Chapman Jones plate speed tester. In addition to the exposure wedge there are four narrow strips of red, green, yellow and blue transmitting definite portions of the spectrum. The idea of these strips is, of course, to show the degree of color sensitiveness of the plate.

Photo. Korr., April, 1921, 87. *Amer. Photo., July,* 1922, 462.

In some investigations on density curves by Arens, he points out that polarization photometers are not accurate unless the negative deposit is neutral, which is almost never the case. Using blue light for illumination, however, the difficulty is avoided, and greater accuracy obtained.

Z. wiss. Photo., July, 1921, *p.* 28.

The absorption of light by the Goldberg wedge has been investigated by Toy and Ghosh who find that the absorption is nearly constant throughout the spectrum. There is a very slight decrease between the yellow, green and red, and the absorption in the ultra violet increases very rapidly with decreasing wave length. *Phil. Mag., Dec.,* 1920, *p.* 775.

A registering microphotometer has been constructed by Moll in which the image of an electric light is focussed on a slit which is projected on the plate whose absorption is to be measured. Another objective focusses another image of the slit on another slit behind which is a thermopile connected to a galvanometer. An electric motor revolves a roll of sensitive paper on which the spot from the galvanometer is focussed by which a record of different parts of the negative may be obtained. Very great accuracy is claimed.

Proc. Phys. Soc., June, 1921, *p.* 207.

A useful table showing the comparative speeds of Watkins,

INTEREST. F. MILTON ARMBRUST.

Wynne, Hurter and Driffield, Eder-Hecht, and Scheiner has been drawn up by L. P. Clerc.

Brit. Journ. Photo. 200, *April* 7, 1922.

LIGHT FILTERS

The processes involved in light filter making have been described by Mr. Smith, at one time with Wrattan and Wainright, in the Brit. Journ. Photo. August 5, 1921, p. 459.

The general theory of light filters is fully discussed from both the historical, and technical standpoints in a paper by G. V. Potapenko translated by Dr. C. E. K. Mees. The classification of filters is discussed from various standpoints and three groups formed into which filters are placed according to their absorption curves: (1) monochromatic filters (2) compensating filters and (3) subtractive filters. The second part discusses three color and compensating filters—their theory and preparation—while the third part describes in detail the manufacture of filters. A very full bibliography is appended. One of the most valuable publications of the year.

Brit. Journal. P., 1921, 507, 522, 534.

The formula for a large number of filters for three color and general orthochromatic photography, together with their spectral properties, has been given in a paper by Charles B. Hodgman. *Brit. Journ. Photo., Jan.* 6, 1922, *p.* 6.

COLOR SENSITIZERS

A new green sensitizer Pinaflavol has been introduced by Dr. E. Konig of the Hoechst Farbwerke. The new dye replaces Auracin G as a sensitizer for spectral green, and has practically no sensitiveness to red, while the green is transmitted from D in the yellow with a maxima at E (530 A.U.). It may be added directly to the emulsion, or applied as a bath at a dilution of 1 :50,000. Except for three color work it seems likely that the dye will find its greatest use in connection with other isocyanines. At first it was reported that attempts to combine the two were unsuccessful, but Konig has stated later that pinaflavol and pinacyanol may be combined. Plates so sensitized require only about half the time through a green filter as a palte sensitized with pinacyanol alone. Eder has examined the dye and reports favorably.

Photo. Rund., 1921, *p.* 80—*Brit. Journ. Photo.*, 1921. (*Color supplement*) *p.* 16—*Photo Rund.*, 1921, 193.

EVENING. H. K. FREDERICK.

According to Namias the addition of a small amount of boric acid (0.1-0.2 per cent) prevents the formation of fog when sensitizing with pinacyanol and pinachrome. The total sensitivity is somewhat lessened, but the color value is not affected. *Photo. Korr., March,* 1920, *p.* 113.

The relations between degree of dyeing, color-sensitizing, and grain size in emulsions has been studied by Dr. Luppo Cramer who remarks that it has not yet been shown why it is that the degree of dyeing of the three silver halides is in opposite order to their aptitude for color-sensitizing. He comes to the conclusion that surface area, or grain size, is the chief factor in determining the degree of dyeing.

Koll. Zeits., Feb., 1921, *p.* 90.

Methods of sensitizing by bathing form the subject of a paper by Walters and Davis of the Bureau of Standards. Formulæ are given for the use of pinacyanol and pinacyanol-ammonia given together with practical notes on panchromatising by bathing ordinary plates. The use of orthochromatic sensitizers is also mentioned, and the method of hypersensitizing panchromatic plates worked out by Burka and Kiess noted. It was found that washing in water increased the speed of most color-sensitive plates slightly, and only slightly increases the fog, while hyper-sensitizing greatly increases the same. The spectrograph used by the authors is illustrated and described, and spectrographic and sensitometric methods of studying color sensitiveness compared. The paper is illustrated with many spectrographs showing the sensitizing bands of the various dyes, the effect of washing after dyeing, and also the spectral sensitiveness of several commercial plates. It is obtainable from the Supt. of Documents, Washington D. C. for 15 cents. (Specify Bureau of Standards Paper 422.)

Miss F. Hamer, of Cambridge University, has prepared and studied the sensitizing bands of fifteen isometric isocyanines. It would seem that the influence of a given component is due both to its nature and also to its position in the molecule.

Photo. Journ., Jan., 1922, *p.* 8.

Luppo-Cramer has found that dyes which sensitize silver bromide have a partial desensitizing action on silver iodide. Gelatino-iodide plates bathed in erythrosin, pinacyanol, or rhodamine B, and exposed under a step tablet, showed reversal

EDNA LEIGHTON TYLER.

in the lower densities. Safranine, however, does not act in a similar manner unless bromide is present.

Photo. Korr., Dec., 1921, p. 276.

Stenger has investigated the keeping qualities of commercial panchromatic plates. He points out that stability depends upon the conditions under which plates are stored, and that properly stored plates keep for remarkably long times. Emulsion sensitized plates appear to keep better than those prepared with a dye bath. Plates were exposed behind an Eder-Hecht wedge and developed in Rodinal 1 :20. The ages ran from 146 to 235 months, and more than half of the emulsion dyed plates were usable. The color sensitiveness was not appreciably affected except for a slight displacement in the orange. Plates bathed in pinachrome, ethyl red and isocol in 1909 were found utterly useless owing to high fog. *Ammonium bromide* appears to assist in keeping plates free from fog over long periods of time, but the addition of ammonia lessens the stability.

Z. wiss. Photo., April, 1922, p. 246.

While not color sensitizing in the generally accepted sense, the method of preparing plates for the extreme ultra-violet deserves notice. Two new methods have been worked out by J. Duclaux and P. Jaentet, two French workers. The first method consists in the use of a thin film of oil in contact with the emulsion during exposure. This oil does not penetrate gelatine and fluoresces in ultra-violet light. The second method, an ordinary plate, is treated with sulphuric acid to dissolve the gelatine which is washed off in slow moving water, and a thin film of collodion flowed over the plate to keep the silver salts in place during exposure. Plates so prepared are said to be sensitive as far as 1900 A.U.

Journ. de Physique, 1921, 156.
Brit. Journ. Photo., 1921, *July* 15, 1921, *p.* 417.

DESENSITIZERS AND DESENSITIZING

Luppo-Cramer has given formulæ for the preparation of a desensitizing developer of the Rodinal type in the British Journal of Photography (June 3, 1921, page 321). The paramidophenol developer is made up as follows: In 125 ccs. of water are dissolved 50 grams potassium metabisulphite, 20 grams paramidophenol hydrochloride and 4 grams potassium bromide. To this is added, taking great care not to overstep the limit, sufficient of a solution made by dissolving 70 grams

DECORATIVE STUDY. TAIZO KATO.

of caustic soda in 90 ccs, of water to dissolve the precipitate first formed. To each 200 ccs. of the mixture is added 10 ccs. of 1:100 phenosafranine solution. The dye is precipitated forming a turbid mixture which must be shaken up each time before use. For use the developer is diluted with about twenty parts of water. Formula for a glycin-safranine developer is also given. *Focus, Feb. 10, 1921, p. 46.*

Safranine has been suggested as a cheap substitute for Metol in the popular Metol-hydrochinon developer, since experiments by Luppo-Cramer and Ermen have shown that the addition of phenosafranine to a hydrochinon developer causes it to work faster and softer in a manner similar to Metol. Luppo-Cramer recommends the following as a soft fast working developer employing hydrochinon.

1.	Water	1000	cc
	Hydrochinon	12	grams
	Sodium sulphite	100	"
	Potassium bromide	1	"
2.	Water	800	cc
	Potassium carbonate	50	grams
	Phenosafranine 0.05%	200	cc.

For use take equal parts of 1 and 2.

For Ermen's sensitometric study of the action of safranine on developers, see Brit. Journ. Photo., July 29, 1921, 445.

While phenosafranine may be used for desensitizing Autochromes Lumiere and Seyewetz advise the use of Aurantia, as it tans the film much less than phenosafranine, and does not alter the rate of development so that the tables for the appearance of the image already advised are still accurate. Tables are given showing the variation in the appearance of the image, and in the total time of development with the normal plate, and those desensitized in phenosafranine and also in Aurantia. It is stated that plates sensitized in the latter may be developed at a distance of about 2 feet from an ordinary candle, or one meter (40 inches) from a 16 c.p. bulb covered with five Virida yellow papers. *Brit. Journ. Photo. (Color Supplement) Aug., 1921, page 29.*

Luppo-Cramer also calls attention to the fact that the oxidation products of several developers are desensitizers, and the particular case of amidol has been the subject of a communication by J. G. F. Druce. In discussing the chemistry of

THE PICTURE BOOK. MERLE BOYER STUDIO.

the subject he points out that it is possible that an imino-quinone substance might be formed having a similar structure to phenosafranine. More work on the products of oxidized amidol must be done before this theory can be proved. Luppo-Cramer explains the same by saying that the developer oxidation products are easily absorbed by silver bromide, and being concentrated on the surface of the grains is able to prevent the splitting-off of halogen even in the presence of a halogen absorbing developer.

Photo. Ind., Oct. 13, 1920, *p.* 664.
Brit. Journ. Photo., May 19, 1922, 296.

The spectral sensitiveness of orthochromatic and panchromatic plates desensitized with phenosafranine has been investigated by C. Bonacini who comes to the conclusion that the action is selective and greatest in the regions in which the added sensitiveness is due to the dye used for sensitizing.

Prog. foto., Aug., 1921, *p.* 210.

Desensitizing by Freud's method using potassium iodide has been brought forward by Bolas. In this process, which was patented in Germany 1908, the plate is immersed in a 4 per cent solution of pure potassium iodide for several minutes, and may then be developed in a brighter light than ordinary. The method and theory were severely criticised later by Bloch and Renwick, who are of the opinion that the method is not satisfactory in practice, and that the explanation of the process given rests on slender foundations. If it is satisfactory in practice there is little likelihood that it will ever be used, owing to the greater efficiency of phenosafranine.

Brit. Journ. Photo., Sept. 9, 1921, 532, *ibid, Oct.* 21, 1921, 627.

Concerning the recommendation of Aurantia by Lumière and Seyewetz, Luppo-Cramer has shown that it is much less effective than phenosafranine, and only suitable for slow emulsions like the Autochrom. *Photo. Rund.* 1921, 255.

A single solution of Metol-hydrochinon-safranine developer kept in a partly filled, colorless and corked bottle in bright light was found unaltered after seven months. As neither the desensitizing, nor developing, powers had materially lessened, there need be no fear of (at least with M-H developers) stock developers containing safranine deteriorating more rapidly than those not containing the same.

Photo. Korr., June, 1921, 148.

PROFILE STUDY. **John Howard Paine.**

Very little work appears to have been done on the theory of desensitizing during the past year. Luppo-Cramer has again brought forward his oxidation theory, but this seems untenable in view of the fact that Lumière and Seyewetz have shown that the original sensitiveness is restored upon complete washing out of the dye, and the latent image is not destroyed.

Photo. Ind., March 30, 1921, 259.

Sensitometric investigations on the effect of desensitizers on the characteristic curve show that developers containing safranine tend to give more contrast and show effects of over exposure. This is considered to be due to the developer acting at a greater depth in the film. Hydrochinon is an exception, and the addition of safranine to it lessens contrasts as has been shown by Luppo-Cramer and Ermen. (See above.) *Prog. foto., Nov.*, 1921, *p.* 287.

Two new desensitizers have been introduced by Konig, of Hochst. They have been labelled "Pinakryptol" and "Pinakryptol Green." The first is colored, but non-staining, while the second is both colorless and non-staining, and in these respects both offer a great advantage over phenosafranine whose tendency to stain has prevented its more widespread use. In a review of the same in the British Journal, R. E. Crowther states that the first is 1½ times more efficient for the blue, and 2½ times for the red as phenosafranine. The desensitizing action of the second dye is even more marked, and is very much more effective than phenosafranine. The speed of development is unaltered with the latter, but Pinakryptol increases the time required by about 25 to 30 per cent.

Brit. Journ. Photo., June 16, 1922, *p.* 352.

PHOTOCHEMISTRY

F. Schanz after a series of experiments on the action of light on albumin repeats his suggestion that the sensitive substance in photographic emulsions is the colloid vehicle rather than the silver salt. It has long been known that gelatine acts as a sensitizer owing to the formation of some undetermined complex with the silver salt, but so far as the writer is aware this is the first case in which an investigator has come to the conclusion that the colloid itself is the light-sensitive substance rather than the silver salt. *Photo. Korr., Jan.*, 1921, *p.* 8.

The photochemical reaction of hydrogen and chlorine is

the subject of a paper by Baly and Barker. The rate of formation of hydrochloric acid is slow at first and rapidly increases to a maximum which is not proportional to the intensity of light. Chlorine expands under illumination, not according to the intensity of light, but to the rate of the reaction.

J. Chem. Society (London), May 1921, *p.* 653.

The photochemical decomposition of silver bromide was followed by measuring the bromine liberated from precipitated bromide under the action of various intensities of light. The curves obtained by plotting the amount of bromine liberated against the log. exposure are rather similar to the H. & D. characteristic curve. A supplementary exposure beforehand was found to have an accelerating effect.

Berichte der deutschen chemischen Gellschaft, Sept., 1921, *p.* 2111.

Renwick's theory of the latent image has been criticised by both Luppo-Cramer and S. E. Sheppard. They consider that the photoelectric discharge of negative electrons from collodial silver is improbable. Sheppard's criticism is found in the British Journal of Photography 1921 p. 4, while Luppo-Cramer's paper is to be found in Photo. Korrespondenz 1920, 259 and 285.

THE SILVER GRAIN OF EMULSIONS

Despite the fact that most investigations on emulsions are carefully guarded by the manufacturers, an immense volume of work on the theory of the silver grain has been published in the past year. The monograph by Trivelli and Sheppard published by the Eastman Research Laboratory last year has probably acted as an accelerating influence, and it is certain that investigations on the role of the silver grains of sensitive emulsions will occupy a large place in future photographic literature.

Svedberg and Anderson have succeeded in preparing plates having only a single layer of grains, and in measuring the variation of their blackening with exposure. The curve obtained is practically identical with the characteristic curve of a plate, and they come to the conclusion that the variation in the intensity of light cannot be the cause of the characteristic curve. Measurements show that with each size of grain there is a definite characteristic curve, and that sensitiveness increases with the size of grain. *Photo. Journal, August,* 1921, *p.* 325.

WINTER. H. V. SCHIEREN.

In commenting on the above paper Renwick is of the opinion that grain size and sensitiveness are not interdependent, and that the properties of an emulsion are probably completely determined in mixing. He points out that there may be an error in the results obtained by Svedberg due to fog producing when dissolving the emulsion, and also to the incomplete development of some grains which would cause them to leave deposits of smaller size. *Photo. Journal, August,* 1921, *p.* 333.

Sensitivity has been defined by Toy as the minimum exposure necessary to make one crystal developable. The sensitiveness of an emulsion consisting of a single layer of grains may be found by plotting the percentage of grains changed against the log. exposure. The curve so obtained is of the regular type, and he comes to the conclusion that grains of the same size are not all equally sensitive to light. He suggests that the variations are caused by variation in the composition of the crystals, and irregularity in the distribution of energy absorbed by the crystal during exposure.

Photo. Journ., December, 1921, *p.* 417.

The rate of darkening has been studied by means of photomicrography and Brooksbank comes to the conclusion that grains of all sizes are capable of darkening, and that grains of the same size and structure are not equally sensitive, as darkening does not take place at the same rate in each.

Photo. Journ., December, 1921, *p.* 421.

The second part of the paper by Weightman and Sheppard, of the Eastman Research Laboratory, dealing with the size and frequency of silver halide in emulsions has been published. Sedimentation and microscopical methods are given for determining the size and frequency. The size-frequency curve of a high speed emulsion was plotted from data obtained by the latter method.

J. Phys. Chem., October, 1921, *p.* 561.

Svedberg has continued his investigations on the relation between sensitiveness and size of grain in emulsions, and an account of further researches on the subject will be found in The Photographic Journal for April 1922, p. 186. He considers the latent image to consist of small centers scattered through the emulsion, and that a grain will become developable upon exposure only if it has one such center. From this

ADORATION. CHAS. L. SNYDER.

a probability expression is determined which agrees very well with other observations on the developability of grains of different sizes after exposure to light.

Svedberg also comes to the conclusion that there is no transport of silver from exposed to unexposed grains.

Photo. Journ., April, 1922, *p.* 183.

DEVELOPERS AND DEVELOPMENT

Alfred Watkins has explained in detail the method used by him in determining the developing speeds of plates for the Watkins speed card. The standard Watkins Thermo M-Q is used at 60 degrees F, and the time required to produce a gamma of 0.9 determined. Tables and calculators for calculating times of development and temperature coefficients are given. *British Journ. Photo., July* 1, 1921, *p.* 383.

M. Delipino has given a formula for Amidol with bisulphite lye to secure the characteristic depth development. The formula consists of 0.5 per cent Amidol, and from 2 to 5 per cent sodium bisulphite lye with a few drops of 20 per cent sodium sulphite solution. *Corr. foto., Oct.,* 1920, *p.* 3643.

"The State of Our Knowledge of Organic Photographic Developers" was the subject of a paper by A. Seyewetz, of the firm of A. & L. Lumière, to the French Photographic Society. The paper contained considerable information in a condensed form regarding the structure of organic developing agents. Should be read in connection with Wein's Organic Photographic Developers, or Photo Miniature 167 Modern Developers. *Bull. soc. fran. photo., June,* 1921, *p.* 129.

The firm of A. & L. Lumière have introduced a developer, Chloranol, which is said to be the equi-molecular combination of monomethyl paraamidophenol (Metol base) and monochlorohydrochinone (Adurol). It is, therefore, somewhat similar to their Metoquinone which is prepared by the Molecular combination of Metol and Hydrochinon. Chloranol is similar to Amidol in that it can be used with or without an alkali which is advised only for very short exposures. Its keeping quality is better than Amidol. It has also been recommended for combined fixing and developing.

Photo. Korr., Jan., 1921, *p.* 26.

The restraining action of borax on development was investi-

FISHING VILLAGE

EUGENE P. HENRY

gated last year by E. R. Bullock of the Eastman Research Laboratory. Its action was originally observed by Luppo-Cramer who attributed it to the formation of a less soluble silver salt, and therefore similar to the action of the potassium bromide commonly used. Bullock finds that the action is greatest with a hydrochinon caustic developer. He disagrees with the theory advanced by Luppo-Cramer, and states that the action is more easily explained by the fact that borax and similar salts while giving an alkaline reaction when dissolved in water, yet have the property of making a strongly alkaline solution less alkaline. Therefore the effect of adding borax to a caustic soda developer is to reduce the alkalinity and consequently lessen the rate of development. It is added that identical results so far as fine grain is concerned may be secured with a low alkalinity of sodium carbonate as with the borax formula recommended by Wellington and Ward and others.

Photo. Journ. America, Oct., 1921, p. 387.
Brit. Journ. Photo., Oct. 28, 1921, p. 639.

Amidol is admittedly one of the finest developers, especially for bromide papers, but has not come into universal use, owing to the fact that it will not keep in solution, and a new batch must be made up very shortly before use. The addition of various stabilising substances has been advised by various authorities in order to overcome this defect and enable the developer to be kept as a stock solution. Bunel recommends the addition of lactic acid (1 dram to 25 ounces) for this purpose, while another French worker Desalme advises the addition of stannous tartrate. He gives the following directions for the preparation of the particular form of double soda-stannous tartrate which he recommends: Dissolve 10 grams chrystallised stannous chloride and 15 grams powdered tartrate acid in 50 cubic centimeters of boiling water. After cooling pour into a cold solution of 2 grams dry sodium carbonate and 250 grams of water. Stir constantly while mixing the two solutions. Make up the total volume to 400 ccs. filter and let stand for twelve hours. For use take 40 cc to each 1,000 cc of developer. Sufficient sodium bisulphite must also be added to neutralize the alkali and prevent fog. L. P. Clerc commenting on the above remarks that his own experiments have not met with complete success. At any rate it seems that glycollic acid as advised by a contributor "Thermit" in the

BUCKING THE TIDE. **August Krug.**

B. J. is both simpler and more effective. The formula recommended is:

Sodium sulphite (dry)	2½	Ozs.
Amidol	200	grains
Potassium Bromide	10	"
Glycollic acid	10	"
Water	75	Ozs.

A quart bottle of the above after standing a week developed 600 square inches of prints without noticeable loss in print quality. *Brit. Journ. Photo.*, 1921, 356.

Druce in a review of other work in the same line points out that Amidol prepared from dinitrophenol by reduction with tin and hydrochloric acid may contain very small quantities of tin chloride which acts as a stabiliser as pointed out by Desalme. The process has been protected by a patent (British Provisional Specification No. 2,070). Amidol so prepared contains stanno-chloride in small quantities, and has excellent keeping qualities.

Brit. Journ. Photo., 1922, 81.

The theory of development has been investigated by M. Volmer who concludes that light alters the position of the silver atoms, or the position of individual electrons, while the atoms themselves are displaced according to the alteration in the energy. A catalytic theory of development is advanced in that the author believes development to be a slow reaction normally, but becomes rapid when silver grains in the emulsion have been affected by light.

Z. wiss. Photo., 1921, 189. *Photo. Korr.. Oct.*, 1921, *p.* 226.

The conditions which affect the activity of several developers is the subject of a paper by Ermen. The effect of bromide on the time of appearance and depression of density was examined as was also the effect of varying amounts of alkali. Amidophenol developers develop without alkali, but more strongly with it, but no increase of activity is secured, above five times normal carbonate. Hydrochinon requires at least N/10 to develop efficiently. Safranine causes Hydrochinon to work faster, but does not appreciably affect Pyro or Metol-hydrochinon. *Photo. Journ. March*, 1922, *p.* 123.

PRINTING PROCESSES

From the practical standpoint perhaps the most valuable articles of the year concerning printing processes have been those by Dr. B. T. J. Glover on factorial development of bromide papers, and the contrast rating and sensitometric properties of the same. Glover has previously pointed out (Brit. Journ. Photo August 26, 1921-503 and Sept. 2nd. 519) that in bromide printing there are two variables, namely exposure and development. It is generally recognised that the two are interdependent and that provided one can be accurately determined the other is readily adjusted. Dr. Glover proceeds to show that the use of the factorial method of development will guide the worker as regards both exposure and development. Each and every developer has its own factor which is probably independent of the paper. This factor should give the longest development allowable without danger of stain or fog, for by so doing the maximum quality of the paper may be obtained. Correct exposure is then defined as that exposure which when developed in a developer to the proper factor gives a print of the desired depth.

Dr. Glover gives the following factors for several popular formulas for bromide paper developers:

Amidol (Kodak formula)	12
Wellington Amidol formula	8
" Metol-hydrochinon	6
Tabloid Rytol normal strength	6
Azol or Rodinal (1-30)	15

Brit. Journ. Photo., 1921, *Feb.* 11, *p.* 87.

J. R. Hall has set forth the need for a numerical expression of contrast for the many grades of paper in use instead of the meaningless terms hard, soft, normal, vigorous, etc., now in common use. He points out that such markings give the user no accurate idea of the contrast of a paper as a paper marked hard by one manufacturer may have no more contrast than that of another maker marked normal.

Brit. Journ. Photo., 1921, *July*, *p.* 407.

H. Taylor supporting Hall's suggestion concerning the numerical representation of contrast suggests that the ratio between the exposure producing the deepest black which the

WILLIAM SHEWELL ELLIS.

paper will give, and that which gives the faintest indication of an image, be taken as the contrast range of the paper.

Brit. Journ. Photo., Aug. 19, 1921, 499.

Dr. Glover replying to Hall and Taylor states that the contrast scale of a paper depends on a number of factors, and is not as simple as supposed. The factors which must be considered in formulating the numerical contrast of a paper are gamma, exposure scale, maximum black which the paper will give, and the shape of the characteristic curve. He also states that in his opinion the numerical statement of the contrast scale of a paper will be of little service to the user, and that the same purpose will be best served by a set of prints on the various papers from different negatives.

Brit. Journ. Photo., Nov. 18, 1921, *p.* 694.

The Carbro process—carbon prints from bromides—is attracting a great deal of attention in England where it appears that several professionals are using it in their studios. It has been still further simplified by F. Garon, and all tissues now require the same time for sensitizing in the new bath which he has worked out. The Carbro process deserves more attention than it seems to have received in this country. It retains every advantage of carbon printing with the added ones of enabling printing to be done without daylight, while large prints in any of thirty different colors may be made without making an enlarged negative. George Murphy Inc., New York, who are agents for the Autotype Company of England, furnish all supplies needed for the process, and also instruction booklets. Garon's formula and procedure have also been published in the British Journal. *Loc. cit., June* 3, 1921, *p.* 327.

In the course of some notes on the Carbro process A. H. Hall states that for best results from developing papers of the warm black variety the prints should be sepia toned by the sulphide method before use. Better quality is claimed for the Carbros so produced. It is also stated that the Carbro sensitizer leaves the print in capital condition for pigmenting.

Brit. Journ. Photo., Apr. 14, 1922, *p.* 211.

C. Puyo, the famous French pictorialist, is the author of a series of excellent articles on the oil pigment process in *Revue Française Photographie* April 1 and 15th, 1922, pages 73 and 88.

Self-toning papers, their history, manufacture and manipu-

JOHN M. WHITEHEAD.

lation, was the subject of a paper before the London South Suburban Photographic Society by P. R. Salmon. Reprinted in the British Journal. *Dec. 9, 1921, pp. 730.*

Formula for albumen, gelatine, collodion and plain papers and theirs manipulation are given in a series of articles in Photo-Era by C. E. Mullin.

Photo-Era, 1922, Jan., p. 30; Feb., p. 92; Mar., p. 138; Apr., p. 204.

A collection of formula for the toning of gaslight and bromide papers in a variety of colors was published by J. Thompson in American Photography for July 1921.

Some interesting observations on the causes of variation in tone by sulphide toning is the subject of a communication from the Eastman Research Laboratory by E. R. Bullock.

Brit. Journ. Photo., July, 29, p. 447.

With this our survey of photographic progress in 1921 must be brought to a close. The field of photography is becoming so broad that it is impossible for any single worker to keep in touch with its progress in all lines even of importance in ordinary work; if, however, the imperfect sketch which the writer has brought together will assist the readers of the *Annual* in locating published matter which will be of service to them in making their hobby more enjoyable, or their profits greater, he will feel amply repaid for the trouble involved in its compilation.

WINTER SHADOWS. G. P. KIMBERLY.

BLOWING BUBBLES. GILL & SON.

CARBON AND CARBRO FOR PORTRAITURE

By PAUL L. ANDERSON

IT should be understood at the outset that carbon and its closely related form, carbro, are not the ideal mediums when a high-keyed result is desired, or when a pure matt surface is to be secured. It is, to be sure, possible to achieve a lustreless surface by the use of carefully made home-prepared transfer paper, used in conjunction with the mezzotint tissues; and it is possible to get high-keyed prints of a fine quality if sufficient care be taken in the manipulation. But carbon normally tends to give a slight tone throughout, and to give a greater or less degree of lustre, at all events in the shadows, so the worker who desires results of the character indicated will do well to resort directly to platinum, thereby securing the effects he wants with the minimum of trouble.

Fortunately, however, so far as portraiture is concerned, we seldom want very high-keyed prints or absolutely pure high lights, nor is a slight amount of lustre undesirable, so that the many advantages of carbon and carbro recommend these processes for such work.

To take up the specific merits of carbon for portrait work, we find first that almost any quality and color of support may be employed. This is of greater importance than might at first appear, since the intrinsic beauty of a photograph depends to no small extent upon the superficial texture of the print, and the choice of a suitable paper has much to do with the final effect. Also, the color of the support plays no small part; it is the function of all graphic art, and particularly of so literal an art as photography, to produce an illusion of reality, and it will be evident that this illusion—of greater consequence in portraiture than in landscape or genre—is more likely to result if a warm-toned support be used, since the normal color of the human skin is yellowish. A blue-white or a neutral white in the high lights is not nearly so satisfactory for portraits.

LOUIS ASTRELLA. **John H. Garo.**

We find, also, that a very wide range of colors is available for the image—some forty or more. It is true that in the best portraiture our choice is limited to some five or six tissues—red chalk, one or two browns, and as many blacks—since the colder colors, together with the more violent ones such as green and purple, are best avoided, even red chalk being used mainly as a foundation in multiple printing. Even so, effects may be obtained which are quite impossible in any other medium except gum, and the laborious character of gum, together with the difficulty of repeating a success, renders it less desirable than carbon for this purpose.

One of the most illustrious, if not, indeed, the greatest of all portrait painters, Rembrandt, is noted—among other things—for the richness and depth of his shadows, and for the manner in which the light grades off into dark. This effect, still of incalculable value in portraits of men and women of strong character, may readily be secured through multiple printing, being easier in carbon than in any other medium except carbro, in which latter it is, in fact, no more difficult or laborious to make a multiple print than to make two single prints. The use of multiple printing has a further advantage in adding a quality which cannot be secured in a single print, for if we use a rather soft negative and build up to the desired depth and contrast through several layers of gelatine and pigment we get an effect comparable to that secured by painting with repeated glazes of transparent color, that is, a sense of looking through, rather than at, the image. This gives a richness which no matt-surface print can ever possess.

It is easier to introduce local modifications in carbon than in any other medium except gum and oil, and if the Garon method of sensitizing for carbro be followed modifications of total contrast are far easier than in any other medium.

Two further advantages which are found in carbro, and are of no slight importance to the average amateur, are that no daylight is needed, all operations being purely chemical; and that prints of any size may be made from a bromide print, thus avoiding the need of a large negative, with the additional chances for failure introduced by the operation of making such a plate.

When it comes to the actual work of printing in carbon, the present writer favors home-made transfer paper over the

commercial, partly because of the wider range of choice thus offered, and partly because the gelatine coating can be more accurately adapted to the result desired. In the writer's book, "Pictorial Photography, Its Principles and Practice," instructions are given for making transfer paper, and we may divide such papers into two broad classes, (1) that in which a relatively light coating of gelatine is applied, in order to secure matt-surface prints, and (2) that in which the coating is relatively heavy, the purpose being to secure a rich quality in the finished picture. By using a moderately rough charcoal paper, giving as light a coat of gelatine as would suffice to hold the tissue, and printing light, in ivory black, the writer has secured prints hardly to be distinguished from hand-sensitized platinum, though such work is rather outside the *genre* of carbon. Incidentally, attention may be called to the fact that ivory black is an exceedingly nice tissue to work with; being rather a weak color, more of the pigment is necessary to give a satisfactory depth, and the result is a very long scale tissue, with more tendency to lustreless effects than is found in most. It is probably the most advantageous of them all when high-keyed effects are desired. For strong prints, as has been indicated, a rather heavy coat of gelatine on the transfer paper is desired, but whether light or heavy, it is well to choose as stout and tough a paper as can be secured, the better to withstand the handling and the hot water of development; this is particularly important if several printings are to be given, and in the latter event it is well to use a heavy card, since a paper is apt to buckle from the drawing effect of multiple coatings of gelatine of varying thickness, in the lights and shadows of the picture. The writer has found the papers and cards of the Strathmore series very satisfactory, also the heavy buff cards of Eaton, Crane and Pike; all of these cards are stout and durable, and do not separate into their several layers on repeated soaking in hot water.

Turning now to the carbro process (the name is evidently a compound of the first syllables of "carbon" and "bromide") the writer favors this very emphatically over straight carbon. Briefly described, it is as follows.

A bromide or gaslight print is made, preferably on a heavy, platino-matt paper, taking care that the high lights are not

MARINE VISTA

G. W. HARTING

clogged, and that the print is allowed to develop for one or two minutes after development has apparently ceased. This print, of course, may be either a contact print or an enlargement. After fixing, washing, and drying, the bromide is soaked in cold water until thoroughly limp, and a sheet of sensitized carbon tissue is squeegeed face down on the bromide, which should have been printed with a white margin to act as a safe-edge. The bromide, with the adhering carbon tissue, is placed under pressure between sheets of glass, with a blotter over the carbon, and is allowed to remain for from twelve to twenty minutes; the exact time is not important, provided it falls within these limits.

This constitutes the printing of the carbon tissue, the reaction between the sensitizer and the silver image of the bromide having the same effect on the gelatine as the reaction between the sensitizer and light in ordinary carbon work. When printing is complete, the carbon tissue may either be stripped from the bromide and squeegeed to a sheet of transfer paper, being left under pressure and later developed as in ordinary carbon work, or it may be developed on the bromide, thus superposing a carbon print on the bromide print. If the former course is adopted the bromide may either be thrown away, or it may be redeveloped in any ordinary developer (no fixing being necessary) and made the basis for further carbros; since contact with the sensitizer bleaches the silver image. If the latter course is followed we may either fix out the silver image with Farmer's Reducer, thus leaving a pure carbon print; or we may redevelop it to a sepia with sodium or barium sulphide, thus obtaining an underlying warm image under the carbon; or we may redevelop it to a black with any ordinary developer, this last course making it possible to go on with multiple printing on the same bromide.

Multiple printing by the non-transfer method is ridiculously easy, for whereas registration marks on bromide and transfer paper are necessary in the transfer method, no such precautions are required in non-transfer; the second sheet of sensitized tissue is squeegeed down on the redeveloped bromide, and the silver image itself takes care of registration. The writer has never put more than three printings of carbon on one bromide, but there seems no reason why an indefinite

CHARLES L. PECK.

number should not be applied if necessary; however, three will generally take care of any desired effect.

The advantages of carbro as compared to carbon (in addition to the ones already mentioned, of workability in any light and of the avoidance of large negatives) are that there is no deterioration of the sensitized tissue, that there is no continuing action, and that it is vastly easier to control. The only disadvantage that the writer has discovered is that in the transfer method there is a slightly greater tendency to frilling, but this is by no means serious. It is worth noting that in carbro, whether transfer or non-transfer, there is no reversal of the image from right to left, as in single-transfer carbon.

There are two methods of sensitizing, that worked out by Mr. Farmer, and that due to Mr. Garon. The former has been worked out in greater detail, to give normal results with all the different tissues, but the writer prefers the latter, as offering greater flexibility. A description follows.

Make up two stock solutions, (A) and (B).

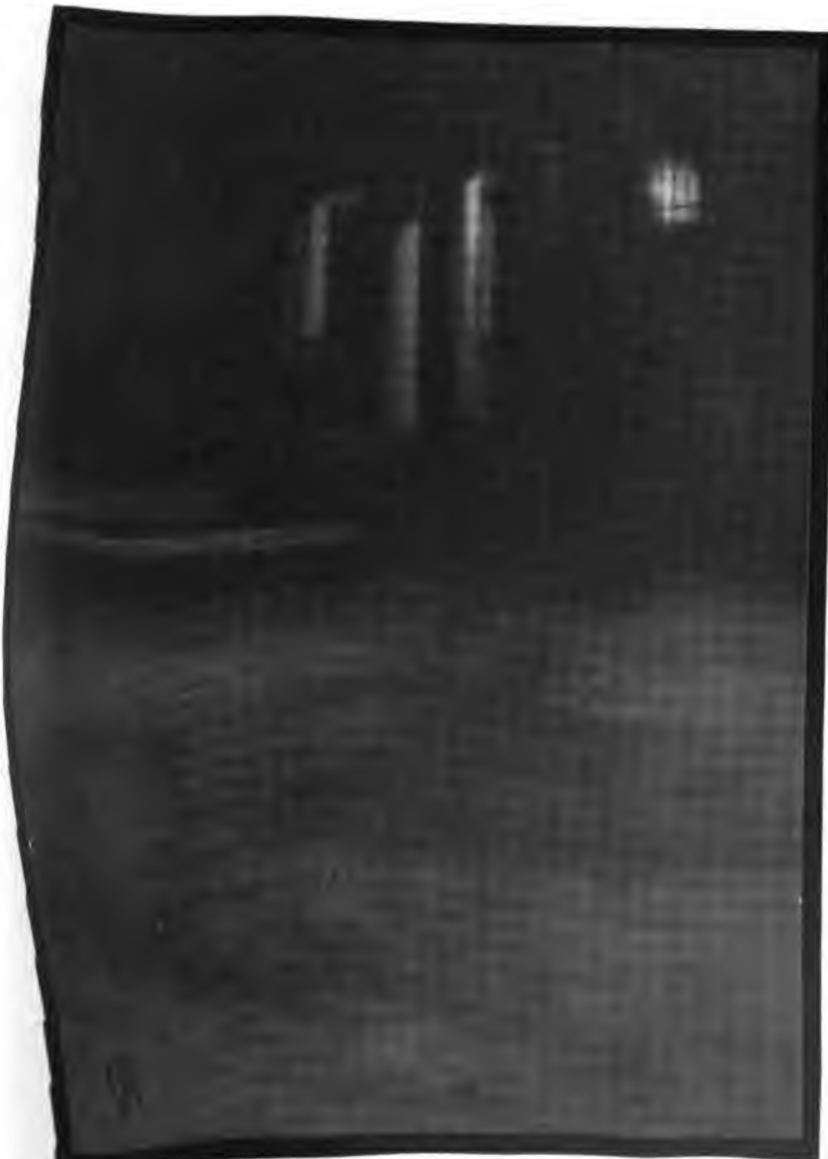
(A)	Water	20 ounces
	Potassium bichromate	480 grains
	Potassium ferricyanide	480 grains
	Potassium bromide	480 grains

For use take (A) 1 ounce, water 3 ounces.

(B)	Acetic acid, glacial	1 ounce
	Hydrochloric acid, C. P.	1 ounce
	Formaldehyde 40%	22 ounces

For use take (B) 1 ounce, water 23 ounces.

The carbon tissue is immersed for three minutes in the dilute (A) solution, drained for fifteen seconds, and immersed for the proper length of time in the dilute (B) solution, a shorter immersion giving stronger prints, longer immersion giving weaker ones. The proper time in (B) will depend on the tissue used, on the quality of the bromide, on the bromide paper used, and on the result desired; the worker must determine for himself what he will do in any given case. As a basis for trial, the writer would suggest twenty to thirty seconds. An idea of the degree of control afforded by this means may be gained from an example from the writer's own work. Starting with two identical bromide prints, two carbons were made, each piece of tissue having the standard three



GOOD CHEER WITHIN. EDWIN B. COLLINS.

minutes in (A), but one having ten seconds in (B), the other ninety seconds. The first print was a normal carbon, reproducing the bromide faithfully; the second, although complete in detail and gradation, was a mere ghost so far as contrast is concerned, resembling more than anything else an undeveloped platinum print. It will be seen from this that the range of control in carbro far surpasses anything possible in straight carbon.

The worker will, of course, determine for himself precisely the color or colors of tissue which he will use in any given case, but as a general suggestion, which the writer has found useful, we may indicate that for high-keyed prints on a white stock ivory black is exceedingly good; while for full-scale effects a buff support, with a light printing of red chalk followed by a fairly strong one of ivory black, will give great richness and quality. In the latter case a second printing of standard brown, either with or without a third of ivory black, will give a depth quite foreign to the red chalk; indeed, the red chalk should in general be employed merely to give an underlying warmth, and should be in no way prominent. Or the red chalk may be omitted, and the first printing consist of standard brown, with a light over-printing of ivory black to add vigor. These, of course, are merely suggestions; the various effects obtainable through different combinations of tissues should be worked out by the photographer himself, modifying the printing depths, and using various qualities of negative; only thus can the worker have at command the great possibilities inherent in the process.

To summarize, then, carbon, which includes carbro, presents the following advantages over other mediums for portrait work.

It offers almost unlimited choice of color and texture of support; it offers a wide range of colors; through multiple printing it offers a richness and depth, a quality, not found in any other medium except multiple gum and oil; it offers the opportunity of introducing slight local modifications; it offers the opportunity of great modifications of total contrast; it offers, through multiple printing, a quality of verisimilitude (by means of color combinations) rivalled only in multiple gum; it eliminates the need of daylight for printing; it makes possible the production of large prints without the intervention

WEST WIND. G. H. S. HARDING.

of a large negative; and it is possible, though not easy, to produce high-keyed prints of a fine and delicate quality.

It is true that in some aspects and for some purposes oil (especially bromoil) and platinum surpass carbon and carbro, but for the general use the writer does not know of any other medium owning so many advantages as the one under discussion. The writer's own preference, for his personal use, is bromoil, but not many workers will voluntarily limit themselves to one print from a negative, and the possibilities of duplication are far greater in carbon than in oil or bromoil; the writer rarely wishes to make more than one print of any subject, so duplication is of little importance to him, and it must be added that the degree of technical skill required for successful oil and bromoil work is much higher than that needed for carbon.

In brief, then, to all those workers in portraiture who are seeking for a fine medium that will combine ease of manipulation with a high degree of that elusive factor known as quality, the writer can confidently recommend the carbon and carbro processes, feeling sure that they will find therein a solution for the greater part of their problems.

E. J. BROWN.

THE BREAKERS ROAR.

WILLIAM S. DAVIS.

BROMOIL DIFFICULTIES

By CHAS. H. PARTINGTON

IN writing on the bromoil process for last year's *Annual* efforts were directed toward a complete outline of the work in order to favor the beginner as much as possible. Formulæ for all the operations as well as details of procedure were given, all being based on the methods used by the writer with great success up to that time.

Since writing the preceding article and continuing the bromoil work, difficulties appeared which were very puzzling at first until the foundation, but not the cause, was determined. The process to-day is still considered a most beautiful one, and I intend to use it at all times for pictorial work, even though things do not run perfectly smooth.

Up to the former writing no difficulty had appeared, and the making of a bromoil was simplicity itself. It was hardly possible to produce a poor result, even through error in the various chemical manipulations. Carrying on each operation in the usual manner produced the results until the inking of the first of a set of four prints which ended in a complete failure. The balance of three produced like results, but my only thought was that some part of the work had been slighted. Another set of prints were made, care taken to see that each operation was properly handled, and all solutions correct in composition. Flat failures in the form of the print refusing to ink on this second set started an investigation.

The first fact that presented itself after consideration of the trouble was that a new batch of paper was being used but which was P. M. C. No. 8, the same as the former lot. Knowing that some P. M. C. No. 3 had also been used successfully, and having a few sheets left, prints were made from this and also the new No. 8. Both papers were handled throughout at the same time in the same solutions with the result of perfect bromoils on the No. 3 and failures on the new No. 8. This experiment settled the fact that the new paper differed greatly from the old, and if any success was to be expected it must be treated differently.

Illustrating article "Bromoil Difficulties," by Chas. H. Partington.

Determined to sift the matter down, the supply houses were visited, and an attempt made to procure No. 8 paper of the same emulsion as my first lot, but none could be located. An examination of the wrapper disclosed the original batch to have been over six months past the expiration date, while the No. 3 was almost as bad. This discovery led to a search for old paper and resulted in locating one dozen Standard "B" stock which is very light weight, and has a smooth surface ordinarily unsuitable for bromoils. Manipulations were carried on as usual with every sheet working perfectly and producing detail and delicate half tones almost beyond belief.

To all appearances the riddle was solved, and it meant that well aged paper was far better than fresh, but the inability to procure the former made it imperative to find a method to handle the latter. The tannin process was not working correctly, and as the bleacher is responsible for this part of the work, a series of experiments entailing many hours in time and hundreds of sheets of bromide paper finally lead to success.

I have wondered how many beginners following the former instructions used unsuitable paper ending in failure, and then condemned the whole process. Have they tried again or read other articles that may have helped by the recommendation of a bleacher or developer other than mine? Let us hope they did not quit entirely, or if so, it is requested that the following be given a trial.

DEVELOPER

Water	10 oz.
Sodium Sulphite	166 grains
Amidol	25 "
Sodium Bisulphite	25 "

Use fresh developer for each print, rinse well and immerse for ten minutes in the following

FIXING BATH

Water	10 oz.
Hypo	1 "
Sodium Bisulphite	100 grains

Wash not longer than fifteen minutes in running water, or five changes of several minutes. Drain and blot surface dry, or immerse at once in

SNOWLIGHT. CHAS. H. PARTINGTON.

BLEACHER

"A"

Water	30 oz.
Coppersulphate	480 grains
Sodium Chloride (salt)	2500 "

Add a few drops of hydrochloric acid to clear the solution. Clearing will be effected in two to five minutes, and rushing it with too much acid will be detrimental.

"B"

Water	15 oz.
Potassium Bichromate	125 grains

FOR USE

A	9 oz.
B	2¼ "
Water	15 "

Wash sufficiently to clear yellow stain which should not be longer than ten minutes in running water. Any slight stain will clear in

FIXING BATH No. 1

Water	10 oz.
Hypo	1 "
Sodium Sulphite	½ "

Fix for six to eight minutes and transfer *without washing* to

FIXING BATH No. 2

Water	10 oz.
Hypo	½ "

Fix fifteen minutes, and wash thoroughly for the same time.

The above formulæ and operations produced perfect inking bromoils on the P. M. C. No. 8 paper that had formerly refused to work. It has produced beautiful results on new or old paper of various grades and makes. Slight differences in the various brands on the market demand slight changes in inking to the extent of lighter or heavier inks and brush action. The P. M. C. No. 8 which refused to work at first must be inked directly after washing out the bleacher, as it does not ink perfectly if allowed to dry. Soaking some makes of paper only until limp produces the best results, while others

AFTER THE STORM. Taizo Kato.

demand a longer immersion in water previous to applying ink.

Many formulæ and methods have been published on this interesting process. The various leading workers all have their pet ways, but it is a question as to what would happen if a change from a certain few papers were made. Pre-war stock was far better for bromoils than the present day kind which seems to form its troubles from a poor paper base, or wide variation in the emulsion. Papers from several years ago are wonderful, and those workers who have not used any other are missing a great chance for education. Success with the old stock was not a difficult matter, but producing a real bromoil with the material available to-day is somewhat of an achievement.

The whole question is in getting the paper in proper condition for inking whether by a change in formulæ, soaking, temperature, or ink. Some little trouble may be experienced at different times but all are urged to keep going. One successful bromoil is worth any amount of time and effort, so to the readers of the *Annual* who have experienced discouragement I say, try again.

CHAS. W. DOUTT.

ROCK BOUND. JOHN C. CLEMENT.

NOTES ON SURF PHOTOGRAPHY

By JOHN C. CLEMENT

ONE of the most fascinating branches of the photographic art is found in making pictures at the seashore, and particularly along the cliffs after a storm. In making pictures of surf, while many beautiful studies may be made in comparatively calm weather, the real thrill comes when the waves are dashing high over the rocks with resistless force. It is a dangerous game if the photographer is not careful to take a safe position out of reach of the breakers.

The pictorial effects that can be secured are endless, but it seems to the writer that the soft focus lens is not as valuable for this purpose as for some other classes of work. The very thing that makes a picture of the sea and surf worth while is the sparkle and crispness of definition obtained with an anastigmat, or possibly a rectilinear lens. It takes time to properly adjust the focus of a soft focus lens, and with the spray flying it is a bit difficult, as well as exposing the camera to a salt water bath.

BREAKING WAVE. Figure 1.
Illustrating article "Notes On Surf Photography," by John C. Clement.

It is entirely possible to get soft enough effects of distance with the anastigmat, and much speed is gained. It will not do, of course, to give such a short exposure as to make the breaking wave too crisp, but with a lens of soft focus an aperture that would give a true rendering of surf would in many cases be too slow. The final result can be slightly softened in enlarging if necessary. It is almost always an advantage to enlarge, as the enlargement brings out the breadth and feeling of the picture.

If one has an eye for artistic effect it can almost always be found, though there is more left to chance than in composing a landscape view. Just after a storm when the tide is on the flood is the best time for heavy surf views, but at such a time the light is often so dull as to make exposure difficult. Storms are not always obliging in the time of their arrival, and to a certain extent conditions have to be taken as they are found. Should the sun be bright especial care should be taken in the selection of a proper viewpoint, else the effect of the force of the waves and of the power that produced them be lacking. Atmospheric quality is especially necessary in views of surf. Another point which has been much emphasized is the importance of a low viewpoint. With the camera too high the waves flatten out in the picture and the effect is lost.

There are many surf and shore views which are very pleasing even though they may not have all the elements of an artistic composition. Referring to the illustrations, "The Breaking Wave" (Figure 1), this was a chance exposure, and was made without any idea of getting an artistic result. No claim of artistic excellence is made for the view "Rugged Shores" (Figure 2), though it is one of the writer's most liked prints.

Just a word for the film pack. Most photographic finishers do not like it, but it has seemed to the writer that this was because each exposure required more individual attention, thereby taking a little more time. It has been his experience extending over a good many years that this possibility of treating each negative separately is one of the strongest arguments in favor of its use.

RUGGED SHORES. Figure 2.

Illustrating article "Notes On Surf Photography," by John C. Clement.

REFRACTION AND ENLARGING

By J. A. ERNEST ZIMMERMANN, B. S.

SINCE we have a great many workers that are not acquainted, or who have only infrequently heard the term "refraction," it is best to define and explain the word. It is the bending of light rays from their normal paths as they pass from a less dense to and through a denser medium, or from a dense medium through a rarer one; however, the index for a definite medium is always the same, irrespective of the angle of light. Most of us are acquainted with the illustration of the stick in water that appears to be bent at an angle where the same touches the water and the air. Having thus defined and explained refraction, the following question arises: "Does refraction play a part in projection printing or enlarging?"

During the year 1921-22, the author had the opportunity to perform, by experiments, the index of refraction for "Kodoloid" furnished him through the kindness of the Eastman Kodak Co. The mean of the results, the values of which were approximately similar, yielded the value 1.216, while the index for glass used in the manufacture of dry-plates yielded the value 1.516. The index for gelatine has not yet been determined, but is under investigation at present.

We will very readily understand why enlargements are "fuzzy," and what actually causes the "so-much-talked-about" diffusion by referring to the illustration (Figure 1). The thickness of these materials used was measured with micrometer, and is herewith given:

Clear glass of dry-plate	.1352 cm
Kodoloid from film negative, clear	.0209 cm
Gelatine	
Emulsified side	.0009 cm
Non-emulsified side	.0008 cm

Using a film negative between two glass plates seems to be the only way in which a negative of this kind can be kept absolutely flat in order to make an enlargement, and due to the fact that we have several mediums through which the

light must pass, we will consider only the impingement of light for the angles 10°, 20°, and 30° which will suffice for this treatise, although the investigation has been conducted for a great many angles of arc. It is also true that the lens tends to bring these light rays to a common focus, but it is impossible to have all these refracted beams meet at a common point, unless every light ray impinges upon the objects at right

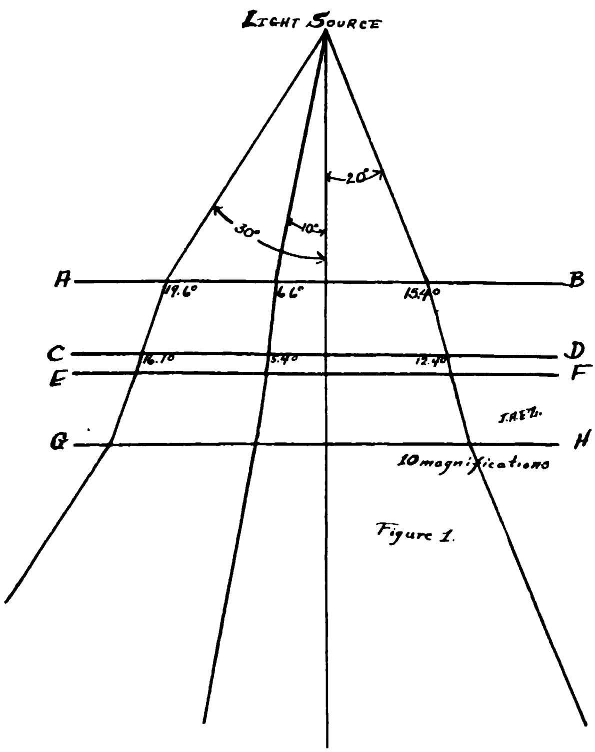


Figure 1.

angles to the refracting surfaces, for at 90° a light ray passes through the medium unaltered.

Let us illustrate: Allow the light ray (Figure 1) to strike the refracting surface AB at right angles and it passes through unaltered, emerging at the surface HG through CD and EF with the same angular displacement. Let another ray proceed with an impingement of 10° arc on the refracting surface

AB. This ray will be refracted and bend from the angle of 10° to an angle of 6.6°, pass through ABCD and emerge striking the second refracting surface CD and pass through the layer CDEF. It will, however, emerge through the layer EFGH with the same angular displacement (10°) if it is the same material. By backward projection of the emergent ray at GH and comparing it with the entrant ray at AB, it will be seen that the rays are parallel and not continuous, but the same have deviated from a straight line course.

Other rays can be easily followed for the angular displacement by studying the diagram. It is possible that the lens corrects some of the non-continuous rays, but the author is not at present able to give any definite statements, as this is also under investigation.

From the foregoing, it is readily seen that the "fuzziness," or diffusion, is due to nothing else than the refractive index, and the passage of the refracted and reflected light rays of the mediums through which the same pass. The same thing is true when a sheet of "Kodoloid" is interposed between negative and printing paper, or by placing the portrait film with gelatine side against the printing surface of the medium in order to produce softness, or to create an artistic atmosphere in the finished product.

It is claimed by some workers that the use of a ground-glass between the source of light and the object to be enlarged removes the action of refractive power, but such claim is not based upon fact. While the ground-glass tends to diffuse the light more evenly over the surface to be enlarged it does not remove the refractive index from the other materials used, and the author has never been able to remove the bending of a light ray from its normal path through a denser or rarer medium. The use of as high as four thicknesses of ground-glass have not caused any noticeable effect, nor changed the index of refraction in "Kodoloid" nor clear glass. It is even doubtful if an increase in the number of ground-glasses will cause an appreciable change.

Whether there is an index of refraction for ground-glass, and what the same is, remains to be determined. It is rather difficult to pass a light ray through this material due to its enormous diffusive power. It is, however, proper to assume

NIGHT'S CURTAIN. W. H. Porterfield.

that the glass does have an index, since all other mediums have indices, and ground-glass does not seem to be an exception to the rule. But is the index of this material greater or smaller than for other glass? Our conclusion regarding the index for ground-glass is a factor, with which one has to deal

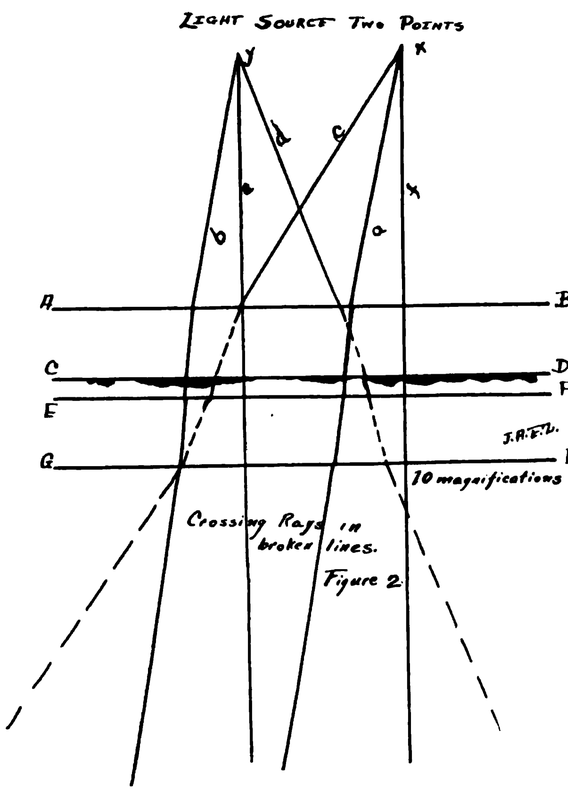


Figure 2.

if it is not the same as other glass. If it is the same as other glass it can simply be treated as one piece of solid material.

In conclusion let us consider Figure 2 in which two points are considered for light sources, in order to show more clearly why projection printings are more "fuzzy." Angles "a" and "b" are the same. The light source x and y proceed to surface AB and emerge after refraction at surface GH where they again move onward in parallel order. The beams "c"

and "d" proceeding from x and y cross each other and cause interference. Projecting them forward to surface AB, "c" interferes with "e". After refraction "c" interferes further with "b". Thus it can be seen that the greater the points of light sources, the greater the interference and the more softness is given to the prints.

The mottled effect in the diagram of CD corresponds to the silver deposit in the gelatine (it is exaggerated) where the light rays as they impinge are either absorbed or allowed to pass through. Since not all rays pass onward, it stands to reason that not all cause interference. A great deal of this interference also seems to be corrected by the lens used in making the enlargement, but as already stated not much can be said at present regarding the lens and gelatine as the same are under investigation.

E. J. BROWN.

BELLE JOHNSON.

THE MAKING OF A PAGET COLOR TRANSPARENCY

By FREDERIC G. TUTTON

ALMOST the only information available on the making of a Paget Color Transparency is the bare outline issued by the Paget Company themselves, while the majority of amateurs are left to guess of a more sure way in which to get the greatest success. Several possible workers in this process have told the writer that their objection to taking up this most fascinating and extremely beautiful process was one of uncertainty, that out of a dozen exposures, you could only expect to get three or four correct color positives.

It is the writer's intention in this paper to give a short road whereby a possible dozen good color transparencies can be obtained from a packet of a dozen plates. To the uninitiated perhaps it would be just as well to give an outline of the principles underlying this process so that they will see in what way this phase of photography slightly differs from making a monochrome print.

Apart from any plate camera which is fitted to take dark-slides, the following essentials are required before embarking on this process. A special filter for eliminating the ultra-violet rays, The Paget Special Taking Screen and panchromatic plate, a special viewing screen and transparency plate. The special taking screen is a glass plate having a gelatinous surface composed of minute squares of orange, green and blue-violet, each square being 1/350th of an inch square. If this screen be placed in contact with the panchromatic plate and a photograph taken of, say, red geranium with leaves, it will be found upon developing the plate that the image is composed of squares representing the taking screen, but with this difference, the red light will have passed through the orange of the screen and made a grey square on the negative, but the green and blue-violet, side-by-side, will be clear owing to the red being absorbed. The green from the leaves will have made a faint grey square, but the orange and blue are not represented, the green having

JAPANESE PEONIES.

FREDERIC G. TUTTON.

been absorbed by these two colors. The same with the blue, being absorbed by the orange and green but passing through the blue-violet.

From this negative a positive transparency being made, it will be noticed that where there was a grey square in the negative, more or less clear glass is represented in the positive, and clear glass in the negative will give a deposit in the transparency. As the "viewing screen" is an exact replica of the taking screen, with the exception of the colors which are slightly different, it will exactly superimpose on the positive, square for square, so that in the case of our geranium, the green and blue-violet color will be stopped out with the deposit on the diapositive corresponding to these colors on the viewing screen. The red square will be more or less clear glass, thus allowing the light to pass through the red only in the screen, giving to the image the sensation of a picture in red. The same with the leaves, only the red will be stopped out by a deposit on the transparency, the others more or less clear glass according to the degree of hue of the green.

From the foregoing it will readily be seen that much of the success depends upon rendering these squares clearly defined, and that the transparency shall be of a good clean black and white. To this end the dark-slide should be fitted with a good spring so that optical contact is made with the taking screen and the panchromatic plate, for it naturally follows that if good contact is not made in the first instant, well defined squares cannot be obtained in the negative. The position of the filter may be in front of, or behind the lens, or, between the lens, but for the sake of convenience, the front of the lens will be found to be the best.

In making the exposure it is essential that the light be tested by one of the exposure meters on the market, such as the Watkin Bee, Wynne Infallible Hunter, or others. Calculators are apt to be misleading in color work, and although the writer has used both calculator and actinometer, better results are obtained when the light is tested than when calculated. As all meters invariably give the minimum exposure, it is best to give at least double this time to insure getting good results, in fact a safe rule is to give double meter exposure under all circumstances.

CARBON PRINT. THEODORE EITEL.

Developing the plate should offer no difficulty to anyone, whether they have previously used panchromatics or not. Provided that ample care is taken to see that no stray light falls upon the plate, it can be developed in a very deep red light, keeping the dish covered during development. The best, of course, is to use either a tank, or one of the numerous "Panchromatic Safe Lights" on the market. It is a matter of importance as to what developer is used, and it is strongly urged that the Special Color Developer supplied by the Paget Company be used. This developer can also be used to develop the transparency. A diluted and prolonged development is to be preferred to the more concentrated and shorter time. During an experiment made by the writer, it was found that a more brilliant color transparency was obtained from a negative developed by the diluted developer than from a negative of concentrated development—although the negatives were of the same subject and received the same exposure one after the other.

This diluted developer is made up as follows:

Paget Special Color Developer	1 part,
Water	80 parts,

and to every one ounce of this solution add 1 drop of 10% solution of potassium bromide. The temperature is noted and the plates are left in for the length of time according to the degree of temperature.

Temperature	60 F or 16 C	Time	18 minutes
"	70 F " 21 C	"	12 "
"	75 F " 24 C	"	10 "

Where the subject is one of great contrast of light and shade, this time should be shortened (according to the degree of contrast), from one to two minutes. If the subject is very flat and somewhat dull in color, two minutes longer should be given for each degree of temperature. To insure that the best is gotten from the developer and the negatives free from stain, not more than six $3\frac{1}{4}$ x $4\frac{1}{4}$ plates should be developed for each three ounces of developer. Fixing is done with any clean working bath, no preference given for either an acid or neutral one.

It is in the making of the transparency where more skill is required. A good printing frame with a pair of strong springs

Mrs. Sidney V. Webb.

is a sin quâ non to making good contact between the negative and positive plate. Nothing of any nature must be interposed between, otherwise the squares would not register. Exposure required is rather a difficult matter to fix, as each case must be decided upon by the class of negative and the illuminant. As a rough guide, ten seconds at five feet distant with a 16 c. p. lamp would be suitable for a normal negative. It is far better to make a trial strip upon one of the positive plates in the same way as making a trial strip for a bromide print, giving say, 5, 10, 15 and 25 seconds respectively. This plate is then developed for *two* minutes in the following developer at 60° F.

Paget Special Color Developer	1 part.
Water	20 parts.

Longer than two minutes immersion will only veil over the clear part of the transparency making the resultant colors somewhat dull. The plate is fixed and well washed, then put aside to dry, away from dust.

The resulting transparency is then superimposed with the special viewing screen, and both moved about until the colors show more or less correct. If the ten second strip was the correct exposure, this strip will show the colors correctly, the five second strip will show the colors rather pale, fifteen second strip the colors rather heavy and the twenty-five second strip will have black predominating. Another transparency is then made, giving to the whole plate ten seconds exposure at the exact distance from the illuminant as the trial plate development is carried out for the same length of time. Of course, it must be quite understood that the above times are only given as a suggestion, the exact trial time must be found by each worker, and once found will form the exposure required for different classes of negatives, but this method of estimating the correct exposure is strongly recommended as being the only method where waste of positive plates is eliminated.

It sometimes happens that neither of the strips show the coloring correctly, the five second strip colors are very pale, ten seconds the colors are still pale, while twenty seconds show the colors too heavy. It may also happen that an exposure between the ten and twenty seconds fails to give a good color

rending. When this happens, it is recommended that a fresh trial strip is made, giving say, five, eight, ten and twelve seconds exposure. This strip plate after developing, fixing and washing in the usual way, must be intensified. The following solution is made up.

Potassium Bichromate	5 grs.,
Hydrochloric Acid	10 min.,
Water	10 ozs.,

the plate left in this until the image is bleached throughout, rinsed in running water for about two minutes and transferred to the following bath.

Potassium Metabisulphite	10 grs.,
Water	1 oz.,

left in this until the yellow stain has disappeared, well washed in water and redeveloped in

Paget Special Color Developer	1 part,
Water	15 parts,

well washed and dried.

Positive and viewing screen is then superimposed, and a note made of the strip giving the correct colors. A fresh positive is then made giving the exposure required, developed and intensified as in making the trial strip. After the final washing and drying, it is then ready to be bound up with the viewing screen for final use.

Binding the two together is done with ordinary lantern binding strips, while the plates are held together with a pair of strong springed paper clips, each side being done separately, and the clip not being removed until all the sides are bound together. It is advisable that a record be kept of the exposures required for each negative, otherwise it may happen that a color transparency is required from an old negative of which the exposure is forgotten. The writer uses a book ruled in the following manner and which explains itself.

No. of Negative	Illuminant	Distance	Exposure	Intensification	Other Remarks
1	16 c.p. Elect.	5 ft.	10 s.	......	......
2	16 c.p. Elect.	5 ft.	8 s.	Yes	......

ATALA. LOUIS A. GOETZ.

HINTS ON ARCHITECTURAL PHOTOGRAPHY

By A. LOCKETT

THERE is no denying that architectural photography is not so popular as it might be, and ought to be. This perhaps, is partly due to a curious heresy started some years ago among certain pictorialists. An architect's triumph, they maintained, lies simply in the masterly arrangement of stone or brick, the clever disposition of line and curve, in relation to the pre-calculated lighting that will fall upon them. Hence, his building is a work of art in itself, and any photograph of such, however happily or originally handled, will be merely a copy of something already there. There is no pictorial credit in making even a first-rate copy of a Raphael Madonna, it was argued; neither, then, should greater praise be bestowed on the copy of a soaring dome by Michelangelo or Brunelleschi, or a campanile of Giotto's.

There is, however, a profound fallacy in this argument. A painting is flat, while a cathedral is not. In copying the painting we have no choice of setting, no possibility of varying the arrangement or composition, no opportunity for expressing individual feeling or sentiment. Technique apart, there is little to choose between two photographs of the same painting by different workers, but there may be all the difference in the world between two presentments of an architectural subject. It is quite possible for one worker to introduce a suggestive meaning and beauty into his rendering of even an ugly, commonplace structure; while another will make, perhaps, but a soulless, monotonously-even and regular presentment of some medieval masterpiece in marble. It is because there has been too much of the latter kind of thing that architectural photography has diminished in esteem. It has given us guide-book illustrations rather than artistic studies.

The antidote, to a great extent, is to concentrate on small portions of the subject, in preference to showing the whole;

Figure 1.

POSTERN DOOR, LAMBETH PALACE.

Illustrating article "Hints on Architectural Photography," by A. Lockett.

to pick out worn and battered parts instead of exquisitely smooth avenues of columns that might be fresh from the builder's hands; to select detail that depends chiefly on curves, avoiding an excess of straight lines; and, most of all, to choose material that has some human appeal, story, or significance.

Much has been written about special outfits for architectural work, the importance of rigidity, the range of movements needful, such as the rising front, side adjustment, swing back, etc. All this is true enough, but the worker must guard against a tendency of succumbing to the mere mechanism of the camera. These adjustments should be regarded as useful means to an end, which may or may not have to be utilized, not as inevitable instruments in an inflexible time-table. We often see an exasperated photographer spending, may be, a quarter of an hour attempting to get his upright lines vertical in the orthodox manner, with spirit-level and plumb indicator, on a slippery pavement. As might be expected, every well-meant touch introduces some fresh deviation. The common-sense way, in such a case, is first to set the camera back vertical to the base-board, to see that the lens-front is also upright and central, and then to fix the camera on the tripod and adjust by moving the latter alone, till the image is satisfactory on the ground-glass.

Here we come to an important point. The ground-glass for architectural work should be specially fine and clear, and there should be ruled on it a number of truly horizontal and vertical lines, about ½ in. apart. These will be of great service in levelling and squaring the subject, since they show at once whether any part of the image is out of the straight. One must not, however, jump to the conclusion that all architectural lines really *are* straight. Some are far from it, especially in old buildings, and when this is ascertained a note should be made, so that they may be allowed their natural slant or slope in the photograph.

The camera back must invariably be upright, and it is undesirable to tilt the base-board if that can be avoided. The rising front should render tilting unnecessary, or the camera may be worked from a higher level. If, by any means, the lens axis is inclined with respect to the plate, the lens must be stopped down. Some workers do not trouble much about

Figure 2.
THE CLOISTER DOORWAY, WESTMINSTER ABBEY.
Illustrating article "Hints on Architectural Photography," by A. Lockett.

keeping the back upright, but are content to correct the slanting lines when enlarging, by tilting the negative and easel. This method is very handy as an emergency resort, but there is no need to turn it into a habit.

If only one lens is available, the most generally useful focal length will be about equal to the longest side of the plate. An anastigmat lens with a large aperture has the advantage for dim interior work, the next best being a rapid rectilinear. For subjects which cannot be approached sufficiently, a low-power telephoto lens is occasionally invaluable.

The best time of day for a given subject will need some attention, the wisest plan being to pay one or two preliminary visits. It is a mistake to accept too trustfully the advice of other workers, or of officials on the spot, because ideals differ considerably. What seems an impossible or eccentric lighting to one person may really be of the greatest beauty if proper judgment and selection are used.

Exteriors are the easiest subjects, though usually less effective in a pictorial sense than interiors. It is interesting to specialize on the smaller details of ancient buildings. Gateways, particularly, occur in infinite variety. The illustration, "Postern Door, Lambeth Palace," is a handsome and substantial specimen, built by Archbishop (afterwards Cardinal) Morton, in 1490.

A voluminous and perfectly opaque focusing cloth is desirable for interior work, otherwise extraneous light will prevent proper judgment of the dim detail on the screen. A good pocket electric torch, held by an assistant where directed, is useful for judging the focus in really dark interiors.

Rigidity is the most desirable property of all in apparatus for architectural photography, on account of the long exposures sometimes necessary, and the fact that an exposure may have to be made in stages, to keep parties of visitors out of the picture. As a matter of fact, the tripod stand is more likely to be shaky than the camera. It should not be too light, nor too springy. To counteract the sliding of the points on polished surfaces, a good idea is to cut three equal lengths of stout wire, about 1 ft. 1 in. long, bending each end over at a right angle for about 1 in. Small screw staples are then fixed in at the sides of the tripod, about 1 ft. 3 in. from the

Figure 3.

IN THE CRYPT, WESTMINSTER CATHEDRAL.

Illustrating article "Hints on Architectural Photography," by A. Lockett.

top. To make the stand rigid, it is then only necessary to insert the ends of the three wires in opposite staples.

It is often recommended to put rubber or cork tips on the tripod points. This certainly prevents injury to a marble or waxed oak floor, but is little protection against slipperiness. A better idea is to borrow a large door-mat, which is nearly always forthcoming; or to obtain three of the thin "kneelers" commonly met with in churches and cathedrals, and to place these under the unprotected points, digging the latter well in.

At the best, the tripod is such a nuisance that it should, if possible, be dispensed with. It is often quite feasible to support the camera on a stone ledge, the edge of a balcony or gallery, the pedestal of a statue, the top of a flight of steps, or similar places which afford opportunities—sometimes even, if officials are gracious, in a pulpit. A useful hint is to carry a square of felt the size of the base-board, on which to rest the camera in such cases; this helps to prevent it shifting. The illustration, "The Cloister Doorway, Westminster Abbey," was secured by resting the camera on a stone seat.

Subjects including polished marble are often difficult, owing to the many reflections. The way to overcome this is to select a dull day and allow a long exposure. This gives sufficient brilliance and character to the marble, without excessive reflection. The illustration, "In the Crypt, Westminster Cathedral," a noble example of modern Byzantine architecture, designed by J. F. Bentley, was obtained in that manner. A liberal and, indeed, what might almost be thought excessive, exposure is advisable in all architectural work, except well-lighted exteriors. Without doubt, an exposure meter is next to indispensable.

Fast orthochromatic plates are best, though they need not be ultra-rapid, and they should certainly be backed. A rather dilute developer usually gives the most satisfactory results, although some subjects will do well with the solution at full strength.

The worker must be prepared to find that architectural negatives will not always respond to "straight" printing methods. Very often control of some kind is necessary, such as shading with a card to keep back thin portions while denser

Figure 4.
CHAPEL OF THE SACRED HEART,
ST. AUGUSTINE'S, RAMSGATE.
Illustrating article "Hints on Architectural Photography," by A. Lockett.

parts are printed deeper, matt varnish and pencil work on the back of the negative, etc. Flat-looking negatives can sometimes be much improved by a little retouching in the high lights.

The illustration, "Chapel of the Sacred Heart, St. Augustine's, Ramsgate," is a typical instance of a subject that needed control while printing. The East end, with the altar, was deeply in shadow, so that, to get full detail in the exquisitely-carved stone Stations of the Cross, seen on the left, a piece of card had to be cut to cover up the end portion when sufficiently printed, this being tacked outside the frame and tracing paper pasted over all.

It may be of interest to state that this somewhat small monastic church is known as "Pugin's Gem." The illustration, "Rood Screen and High Altar, St. Augustine's, Ramsgate," will give some idea of the rich, yet dignified and sombre, ornament lavished upon it in every part. Here, again, the stained glass window wanted extra printing, so a card was cut with an opening the required shape but a little smaller, and tacked over the frame with a covering of tracing paper, as before described.

There are many subjects which can be rendered perfectly with one of the tiny modern pocket cameras, fitted with a high-grade lens and taking either films or plates. The photographer who is fortunate enough to possess several of these may greatly shorten his total time of working by setting them to expose at different points simultaneously, whether in addition to his stand camera or by themselves. Of course, this can only be done when there are but few people about, or there might be a case of kleptomaniac annexation! Owing to the depth of definition of the short-focus lenses, the small negatives, or even selected portions, can be enlarged to a remarkable extent without appreciable loss of detail.

It may safely be asserted, in conclusion, that the worker who has hitherto confined himself to taking more or less tame and hackneyed pictures of landscapes, which invariably lose when mentally compared with their brilliantly-coloured originals in Nature, will find a new pleasure in his craft on making acquaintance with architecture as a photographic study. Here, his results are not so likely to disappoint, but, on the contrary,

are often apt to reveal new and unexpected beauties, which failed to attract notice in the original building. Studied historically as well as artistically, they will offer a constantly widening field of interest, instruction and admiration.

Figure 5.

ROOD SCREEN AND HIGH ALTAR,
ST. AUGUSTINE'S, RAMSGATE.

Illustrating article "Hints on Architectural Photography," by A. Lockett.

SNAP SHOTS ABOVE THE CLOUDS

BY WARREN R. LAITY

NOW, when there is scarcely a town of any size which does not have an aeroplane visiting it for the purpose of taking up passengers, it is only natural that the cameraist should turn his attention to getting some photographs from the air. And especially so when almost every pictorial supplement, or thrilling movie, has some marvelous examples of this fascinating phase of photography. There are no more difficulties attached to this type than any other snapshot work, though certain points must be kept in mind, and the purpose of this treatise is to acquaint the reader with these points.

When you first enter the plane and seat yourself behind the screeching motor, and from thence on until you have lumbered heavily across the field and finally drifted exultantly into the air, you will be in no mood to use a camera, and you must expect it to be so. Even after the plane is well up and climbing on toward the fleecy clouds it is best to sit tight and take it all in. It is only the most experienced flyers who are not absorbed by the moments when the plane is transforming itself from an awkward bumping monster into a swift gliding creature of the air. Once up where the earth begins to assume the appearance of a huge map, you can begin to collect your photographic thoughts.

The camera may be any of the usual hand types, among which are the hand camera, the Graflex, or a regular aerial type. All do good work, though each have their own limitations. The hand camera should possess one of the wider aperture lenses which work at F/7.7, or larger. The shutter ought to have a speed of 1/100 of a second to overcome the vibration of the motor and the speed of the plane. A direct view finder is a great aid, for the safety belt makes it impossible to use the regular finder, as it is necessary to remain strapped to the seat.

The Graflex will do the same class of work as the hand camera, though the lens is apt to be better, and there is no danger of the wind crumpling the bellows. It is best with

CAPITOL AT WASHINGTON, D. C.
Altitude About 2500 Ft.

E. J. BROWN.

this camera to bring the shutter speed to 1/100 of a second by increasing the tension of the curtain spring to the maximum for that speed. The particular value of the above cameras are that, with a lens of normal focal length, it is possible to include a portion of the wing or other plane structure which gives the desired perspective so often lacking in the pictures made by the regular aeroplane cameras. These aeroplane cameras, though using only a 4x5 plate, are often fitted with an 8¼ in. lens. The result of this is that, if any part of the plane is included it is generally a bit of meaningless fuzz. Of course, this telescopic feature is very essential at times though it does not produce the pictorial effect of perspective.

The subjects will vary with the locality, but it is wise to pick out those sections of landscape that have plenty of contrast, for the average aerial landscape takes "flat," due to the haze, and it is well to introduce some brilliant subject to break it up, such as a city, picturesquely laid out in parks and squares interspersed with some fine public buildings, a stream, pursuing its devious way under bridges, by a town or perhaps uniting with another body of water. A curving shore line, where white crested waves break on a sandy beach or over dark masses of rock, presents a dramatic subject. If you chance to live near a large city there ought to be opportunities to photograph prominent buildings at such angles as to reveal secrets of plan and structure that the casual observer never sees.

Another entrancing subject is a sunset pictured from above the clouds. Here the effect is overpowering, and the great feathery billows tinged with red and gold stretch out like an ocean stilled in its tossing. A sight like this calls forth all the poetry of your soul and makes you long to crystallize the scene. A filter will help in any of this work, and especially here, though it is well to use the weakest one possible, and retain speed, the K1, W & W being the best standard to go by. When you have become more experienced it is exciting to arrange with someone else in another plane for an "aerial rendezvous," and take turns snapping each other's pictures. For this though the pilots must be well trained, and it is even then a delicate proposition to fly near enough each other to get recognizable pictures.

"THOU CHILD SHALL BE CALLED THE PROPHET OF THE HIGHEST."

Roy H. Heiser.

The exposure should be the same as for subjects on the ground, but, due to haze and angles of reflection it is best to increase it about a third more. In oblique snaps the time is essentially the same, but when looking down this increase must be noted. It is possible to use less time than 1/100, and more also, though that must be left to the judgment of the operator. At all times he must realize that the camera should not rest on the plane, for the intense vibration will ruin the snap. And too, it should be noted that while near the earth the fast shutter speeds must be employed, for a plane travels between 60 and 80 miles an hour normally, so the pilots tell us. It is so fast, however, that houses and other objects appear elongated and blurred if the shutter speed is not sufficient to overcome the plane speed.

Judging approximately, 1500 feet altitude is a good place to begin photographing. And in order to find out how high the plane is, it is wise to arrange for signals with the pilot. A very good idea when nearing the ground, or whenever making an exposure, is to have the pilot stop the motor and let the plane drift while the picture is being taken. If the passenger can stand it, the plane could be slightly banked at the same time in order to insure a better view. In all these matters let me urge earnestly that the *arrangements* with the pilot, the shutter calculations and exposures *be planned before the start,* for once up, you may not be able to think as clearly as you may wish.

It is generally advised to develop in pyro and place the negative directly in the hypo in order to get the greatest contrast.

STILL LIFE DR. F. DETLEFSEN.

ON THE PRESENTATION OF A PHOTOGRAPHIC SALON

By PERCY NEYMANN, Ph.D.

THE first international Salon of The Pictorial Photographic Society of San Francisco was on view at the Palace of Fine Arts from May 19th, to June 24th, 1922.

Illustration No. 1 represents a corner of one of the series of connecting rooms used, and demonstrates the manifold advantages of hanging photographs, or prints of any kind, on a line with the vision of an observer. The frames permit of the use of glass, the proper placing and protection of prints, and the use of a neutral tint background.

Inspection of illustrations Nos. 2 and 3 demonstrates at a glance that there is something wrong with the presentation of the prints in No. 3. The primary error is in the overlapping

(*Editorial Note*). Dr. Neymann is the Secretary of the Pictorial Photographic Society of San Francisco, the earnest body of men who are to be accredited with the Salon mentioned. The deductions are the product of experience and study. The Salon committee has brought to bear on their ideas the opinions of many pictorialists. Mr. Laurvik's standing among Art Museum Directors and artists is such as to make an opinion or a suggestion from him of the highest value.

Figure 1.

ONE OF THE CONNECTING EXHIBITION ROOMS, SAN FRANCISCO SALON.

Illustrating article "On the Presentation of a Photographic Salon," by Percy Neymann, Ph. D.

of the mounts, prompted by the desire to economize in space. There should have been but two of the prints in the one frame. The ratio of the area of mount showing is to the area of the print as three to one for each print.

In a conversation with Mr. J. Nilsen Laurvik, Director of The San Francisco Museum of Art, through whose interest and courtesy the Salon was so well shown, Mr. Laurvik expressed the opinion that a ratio between the size of print and the size of mount should be determined. What that ratio should be is a problem not readily solved.

Figure 2.
THE CORRECT WAY OF MOUNTING AND EXHIBITING PRINTS.

It is solved, however, by the arrangement and mounting of prints as shown by illustration No. 2. The card or underlay upon which these prints are mounted extends about one quarter inch beyond the print at the top and sides, and one half inch at the bottom. The prints are fastened to the backing, consisting of properly tinted beaver board or its equivalent, and this forms an ideal background. To the minds of all observers who have been questioned this method of presentation is superior.

Aside from the artistically ideal exhibition of prints at a Salon, there are considerations favoring the more practical aspect. Among these are the economy in mounts and mounting, the

economy in packing and transportation, and the avoidance of unnecessary bulk and weight.

The observations recorded above are virtually a discovery made and a lesson learned at the San Francisco Salon of 1922. We ask the reader's indulgence in stating the following, considered as a guide to the presentation of future Salons, and as a beneficial suggestion:

While the San Francisco Salon had the distinct advantages of showing prints as described and illustrated, there is no reason why these advantages should not be accorded any Salon, provided the energy and aggressiveness are forthcoming.

As an example of the best possible presentation of a photographic exhibit, the statement of those who have seen many Salons is to the effect that the first Salon at San Francisco equals, if not excels, the showing of prints anywhere at any time in the past, and we, therefore, expect and solicit the co-operation of Salon officials and contributors to the end that all Salons, wherever held may be shown with an appreciation for greater beauty and greater benefit to the public and photographic art.

Figure 3.
THE WRONG WAY OF PRESENTING PRINTS FOR EXHIBITION PURPOSES.

Illustrating article "On the Presentation of a Photographic Salon," by Percy Neymann, Ph.D.

RAPID FIXING BATH

By HENRY F. RAESS

ABOUT fifteen years ago some one proposed the addition of ammonium chloride to the usual fixing bath to increase its rapidity of fixing. The theory is that the bases change places with the formation of ammonium thiosulphate. While this new fixing bath does work more rapidly, it seems to have aroused but little general interest, and apparently no practical application was made of it.

But the use of ammonium thiosulphate instead of sodium thiosulphate or "hypo" is not new. It was first suggested by John Spiller in 1868 and has at times been indorsed by various workers. But the cost made it prohibitive, which is about thirty times greater than ordinary "hypo."

There is a class of photographic work where speed is very important, as for instance in newspaper work, especially when having to catch an edition. Then there is photo-syndicate, passport, "photostat" and no doubt others.

At the time that this new fixing bath formula appeared in print the writer made some rather rough tests, and found that as the amount of ammonium chloride increased the speed of fixing became progressively greater. The bath on standing also evolved ammonia gas (NH_3) probably due to the action of the alkali from the developer.

But most photographers think by increasing the amount of "hypo" in their fixing baths they will also reduce the time of fixing. How true this is will be seen in the table below.

Table No. 1.
Plain "Hypo."

10%	15%	20%	25%	Saturated solution about 40%
Sp. Gr. 1.053	Sp. Gr. 1.084	Sp. Gr. 1.117	Sp. Gr. 1.140	Sp. Gr. 1.406
13 minutes	9½ minutes	5 minutes	4 minutes	No action after one hour.

The specific gravity of the plain "hypo" solutions are also

THE CHRISTMAS HYMN. KATE MATTHEWS.

given for the benefit of those who like to prepare their baths by the hydrometer. To ascertain the speed of fixing fast plates were cut into one inch strips and the determinations made with these.

It will be noticed that the practical limit is reached at 20% although 25% is slightly faster. Above this strength the speed gradually becomes slower until saturation is reached when fixing practically ceases.

The one formula containing ammonium chloride for a rapid fixing bath which was published at the time as mentioned above made the rounds of the photographic magazines with practically no change. Apparently no one undertook to see if the maximum speed had been obtained, or if any improvement could be made. For a time this bath became quite popular and several European photo-chemical manufacturers placed it ready for use on the market, but it soon was forgotten again.

The Lumiere's instituted some tests with the new bath, and issued a warning that it was important to remove all the chemicals after fixing by a thorough washing to insure the permanency of the plates, films or prints. But those who have used this type of bath found no later difficulties through its use and liked the results. It was the writer's endeavor to evolve a formula possessing the greatest speed and having no disadvantages. Ammonium chloride was added to the above plain "hypo" solutions (See Table 1), in molecular amounts to form the corresponding ammonium thiosulphate, due regard being paid to the fact that sodium thiosulphate crystals contain five molecules of water and ammonium chloride none. The same also for ammonium thiosulphate which is practically anhydrous. Comparisons were also made with ammonium thiosulphate of equal (molecular) strengths (See table 3).

Table No. 2.

"Hypo" with ammonium chloride.

10%	15%	20%	25%
6 minutes	1½ minutes	2 minutes	2¾ minutes

OCEAN, THOU MONSTER. *Percy Heymann.*

Table No. 3.
Ammonium Thiosulphate.

10%	15%	20%	25%	30%
7 minutes	not made	1¼ minutes	1¼ minutes	1½ minutes

From table No. 2 it will be seen that the maximum fixing speed is reached at 15%, while the original formula called for a 22% solution, and consequently was somewhat slower.

The next step now was to make a bath of the greatest speed which would not evolve ammonia (NH_3) and harden the gelatine at the same time. The writer for some time had been using the Kodak fixing bath for plates, films and paper with excellent results. The fixing speed of this bath which contains about 22% of "hypo" was six minutes. The amount of ammonium chloride necessary to form the ammonium thiosulphate in the Kodak bath was then weighed out and divided into four portions, and the fixing speed noted after each addition to the bath. After one half of the ammonium chloride had been added the maximum speed had been reached—this was two minutes. Additional amounts of ammonium chloride decreased the speed of fixing. The Kodak fixing bath with ammonium chloride has the following composition:

Water	1 gallon	4	litres
"Hypo"	2 lbs.	900.0	gms.
Ammonium chloride	6 ozs. 5 drams	195.0	"
Hardener	16 ozs.	500	C.C.

Hardener Stock Solution.

Water	40 ozs.	1200	C.C.
Sodium sulphite, dry	8 "	235.0	gms.
Acetic acid, 28%	24 "	720	C.C.
Alum, common	8 "	235.0	gms.

Those who prefer their own formula for a fixing bath may get approximately the same increase in speed by adding 1/5 of the weight of "hypo" of ammonium chloride, excepting in the case of plain "hypo" bath, then add slightly less than one-half. The purity of the ammonium chloride used was that known as "technical" and cost about twenty-five cents per pound.

LARGE HEADS IN PORTRAITURE

By T. W. KILMER

AT a recent meeting of prominent New York photographers, one of the speakers said that the man or woman who could successfully make large heads in portraiture, would not want for success as a portrait photographer. I truly believe that this man spoke words of wisdom; for if there is one branch of photographic portraiture that is hard to accomplish, and which is "murdered" more than any other, it is the correct photographic rendition of a person's head.

To most of my friends who have so kindly sat in front of my 18 inch lens, it has been their desire to be so reproduced. It is true that the trunk, arms, and hands, and in some instances the remaining figure, are distinctive attributes of the head, but in ninety percent of people, it is a photograph of the head (face), that their friends desire to keep as a photographic document.

In this age of specialism, the man who makes photographic portraits of but one thing, the head, is going to get better results than the man who photographs the head, arms, hands and a large part of the trunk. The former sees but one thing, and does but one thing, while the latter has a confusion in numbers, and the final product is anything but pleasing.

In portraits of the face alone, the light should be fairly high, and not counter-balanced by an over-use of the reflecting screen. The background should be of a uniform tint, either dark brown, or dark grey. The background should not be too close to the sitter. An element of atmosphere is created by placing the background several feet back of the sitter. The lens by all means should be of a sufficient focal length. Do not ever try to make a head on an 8 x 10 plate unless you use a lens of at least eighteen inches focus, for if you do, you will certainly get distortion in the features of the person photographed. I am absolutely sure of this, and know it to be so, because I have experimented exhaustively along this line of large heads and long focus lenses.

HEAD OF A HINDOO.
Illustrating article "Large Heads in Portraiture," by T. W. Kilmer.

For a large head, do not stop the lens down. I am in favor of a slight amount of diffusion, either procured direct in taking by means of a soft focus lens, or done by projection. In the taking of large heads, have the sitter's nose about on the level with your lens. Do not shoot down or worse still, up, at your sitter. Bad results will follow. Give a good generous exposure, and do not over develop your negative. I always use artificial light; Cooper-Hewitt tubes, tempered a little with a few nitrogen bulbs. I get better results with film than I do with plates, especially where a full open soft focus lens is used.

The spacing of the head with reference to the boundaries of the size of print, is very important. Never place the head in the center. It is my favorite custom to place the head a little to one side of the print, and have some highlight or shadow on the opposite side of the print to balance the head. Give the head room into which to look. The pose of a head is greatly controlled by the position in which the person sits. Do not let them squat in a chair, have them sit on a good hard posing bench, give them room to sit.

My favorite printing medium for large heads is multiple gum. The first few printings in brown and the last two or three of charcoal grey, or ivory black.

CHAS. W. DOUTT.

HEAD OF AN ARAB.

Illustrating article "Large Heads in Portraiture," by T. W. Kilmer.

SHARP OR "FUZZY" PICTURES?

By A. H. BEARDSLEY

IT has been with no little interest that I have been following the trend of picture-making during the past fifteen years. When the anastigmat lens was first winning its way, sharp definition was the thing; and pictures were approved or rejected on the basis of their brilliancy, crispness and detail. Lenses were compared with sharp definition as the standard.

Then, came a reaction. Some thought that pictures were too sharp and that they lacked atmosphere—whatever that may or may not be. A soft-focus lens made its first appearance, and it was "soft" in definition and covering-power. As one amateur expressed it, at the time, "The pictures look just as well upside down as right side up. If it wasn't for the title, I wouldn't have the faintest idea what the photographer had in his mind, let alone what he thought he saw in front of the camera."

Photography appeared to be going through its cubist period. Even the most "pictorial" pictorialist of to-day would admit that some of the first soft-focus pictures appeared to be the result of tremendous nervous strain and hallucination on the part of the "advanced" photographer of the period. Gradually, such extremes gave place to more recognizable and pleasing pictures, although diffusion was still very much in evidence.

The "advanced" amateur, or professional, continued to explain atmosphere and to tell us that what he showed in his picture was what we saw in nature—whether we did or not. And so things went along, until soft-focus lenses increased in numbers and in popularity, among those photographers who called themselves pictorialists. Others bought soft-focus lenses and either mastered them, or gave up photography altogether. Finally, we arrive at the present. The soft-focus lens is strongly intrenched, and there are many excellent types. Likewise, the anastigmat lens is still very much in evidence. As I said in my paper in last year's *Annual,* both types of lenses should be used, and not one or the other. The choice of which

to use must depend on the photographer's good judgment, experience, art-training and the subject.

This brings me to a consideration of sharp or "fuzzy" pictures from the point of view of amateur and professional photographers and the general public. I might add that whatever observations I may make are based on facts, and with a sincere desire to induce a frank and constructive discussion that will help us all. What we need in photography to-day is less faddism and more getting down to the beautiful, fundamental principles that make photography second to no art or science.

Let me mention briefly a few incidents that served to awaken me to a realization that amateur and professional photographers, and the general public, are seriously weighing the relative merits of the sharp or "fuzzy" picture as exhibited at salons, in the press, at the motion-picture theater and in the home. First, a photographic magazine of unquestioned excellence, editorially and typographically, lost a number of subscribers who wrote plainly that they would not renew their subscriptions because of the prominence given to "fuzzy" pictures in its pages. They would renew gladly when "nice, clear-cut illustrations were used." Second, a would-be exhibitor asked me whether he dared to send a bromide enlargement to one of the large salons. He assumed that unless the picture was diffused or manipulated with oil or crayon it would receive small consideration. When I tried to reassure him he asked, "How many salon prize-pictures are well-defined, brilliant and attractive to the average beholder?" I had to admit that, of late, I had seen very few. Then he added this shot, "If these are *photographic* salons, why don't they stick to photography instead of permitting oils and crayon under the cloak of art? Isn't photography strong enough to stand on its own feet without leaning on pigments and pencils?" Third, an educated gentleman who visits art and photographic exhibitions with the sincere purpose of self-culture—although he is not a photographer or artist—writes a long letter which might be summed up in the question, "Why do camera clubs, and those interested in promoting photography, try so hard to get away from photography in the pictures that they hang for exhibition? The public goes to photographic salons and exhibitions to see *photographs!*" Fourth, another correspondent, a well-known physician, asks, "What is the idea, anyway, to

R. B. M. Taylor.

perfect and simplify photography, and when you have it within the grasp of the average individual, to turn right around and make it something that is neither art nor photography, and beyond the ability and interest of the educated layman?" Fifth, and lastly, one irate lover of sharp pictures asks bluntly, "Who told these 'fuzzygrafters' that a clear, well-composed bromide enlargement could be 'improved' by daubing it up with oil, gum and crayon; and, on top of that, make the original picture with a soft-focus lens? If they like to paint pictures why don't they paint them instead of messing up a good photograph?"

I might cite other comments of a mild or vituperative character—all against the present-day prominence given to "fuzzy" pictures. An interesting fact is that the verbal and written opinions against the "fuzzy" picture far outnumber those in favor of it. Moreover, these expressions come from photographers themselves, as well as from those who might be said to represent the general public. And again, they are all voluntary, and evidently actuated by a desire to arouse those concerned to a consideration of the situation as it presents itself to-day.

Taking into consideration every side of the matter, the question looms up as to whether or not the public is to be considered at all. Are the pictorialists sufficiently sure of their strength to say, "Here is a picture that is a work of true art, admire it, praise it and buy it," and to assume virtually that the public has no voice in the matter? Moreover, are they sure enough of themselves and their pictures to condemn as uncultured those who fail to admire their "fuzzy" works of "art"? In short, is it possible for a small but active minority to compel people to like something that does not appeal to them, merely by the assumption of a superior air of "artistic" culture which almost pities those who say frankly that they prefer clear, but not necessarily "wiry" pictures?

There is no doubt that there are many extremely beautiful soft-focus photographs which even the general public is not slow to praise; but these are out of the ordinary and not in the usual run of "fuzzy" pictures. As I understand it, a *real* picture speaks out for itself, it tells a story, it needs to lean on no title and it affects the beholder even as a beautiful melody. If a picture must be explained, must be supported

by much argument, must have a title and must be helped along to gain even the momentary glance of the beholder, then I am free to say that it is not a true picture, as I understand it. If I remember correctly, a famous art-critic once said that a *picture* was one that appealed to the trained connoisseur and peasant alike—that was the supreme test. This is true of sharp pictures as well as "fuzzy" ones.

With all our vaunted education and freedom of thought and speech, many "follow the crowd" because it is the thing to do, or because the "crowd" is strongly intrenched in popular favor. This applies to virtually every human activity, and photography is no exception. There are some camerists who have wasted much time and money on the gum or carbon-process, *not* because they liked either process for themselves, but because they thought that they ought to do so in view of their desire to be considered a pictorialist, or wished to be thought progressive, or simply because some friend thought that it was the thing to do this season at the camera club.

Many times, in these pages and elsewhere, I have advised my readers to stand upon their own photographic feet. By all means, let them study the work of recognized masters, learn all that is possible to learn; but when the time comes to choose for themselves in what direction they wish to travel, let them lean on no one but themselves and their own experience. Whatever they elect to do will be done because they will know what they want and why—not because Mr A. or Mr. B. did so or said so, nor because "the boys" at the camera club are "all doing it" this year.

Let me remind my readers again that, in this article, I am setting down facts and comments, not because I wish to condemn the "fuzzy" picture, nor to belittle the beautiful work of most of our pictorialists. However, I do feel that there is a quiet, but strong, reaction against the extremes and faddism that has characterized some of the pictorial work that has appeared at salons, exhibitions, in the photographic and lay press and on the motion-picture screen. Mind you, when letters from the four corners of this country, and even from Europe, point which way the wind is blowing, then, it seems to me that we should all get together and consider the matter frankly, and without any other motive than the future success and prosperity of photography.

FOUR SCORE. FLOYD VAIL, F.R.P.S.

Even at the risk of repetition, I am going to conclude this article by adding a few paragraphs which are written for the benefit of those who are either beginners or amateur photographers, and who appear to be at a loss to know what to do to win photographic fame and fortune, in view of the present situation. What I say is with the desire to help, and to further in every way possible the *permanent* pictorial success and prosperity of all lovers of photography, whether they be of the sharp or "fuzzy" school.

My own advice to the beginner or amateur photographer of little experience is to let "fuzzy" pictures alone until he can make good sharp pictures. In a sense, the making of a sharp photograph is to the diffused one as the practising of musical scales to the rendering of a vocal solo. There must be a firm foundation upon which to build. I have always advocated the mastery of a sharp lens before attempting the use of a soft-focus objective, and I extend this advice to include the making of prints. Of course, there may be exceptions; but I venture to say that the average inexperienced beginner would have his hands full with a new soft-focus lens. Many a novice finds it a difficult problem to focus a sharp lens correctly, even when he can see the difference between "in focus" and "out of focus" on a ground-glass, or on the mirror of a reflecting-camera.

The soft-focus lens and diffused picture are here to stay and, in the hands of experienced workers, they are a splendid means to artistic photographic expression. However, even in the hands of the pictorialist of reputation, a soft-focus lens does not always produce a satisfactory result in the eye of the beholder. With all due respect to the many beautiful masterpieces produced by eminent pictorialists, there are a number of pictures among them that I admit I cannot appreciate or truthfully say that I like. In some quarters, there appears to be a striving for effect at the expense of true beauty and appeal. To say the least, the beginner is no match for the pictorialists that have had years of experience, and possess the necessary photographic equipment. Hence, let him make good, sharp pictures for a time until he is qualified to know exactly what he wishes to do, and is able to do it intelligently and successfully.

From the number of letters received, it is evident that there

THE LONELY RIVER. C. A. PIERMAN.

is still a strong preference for the sharp, although not necessarily the "wiry" picture. Unfortunately, I am between the upper and nether mill-stones, and eager to do justice to good pictures, whether they be sharp or diffused. However, I must say that in certain cases the camerist is apt to be led to form his opinion by those who express theirs in the most forceful manner.

In photography, as well as in other human undertakings, a man should remain true to himself and to his honest opinions. Because some well-known critic approves a picture does not make it compulsory for me to like it. Of course, my lack of appreciation may be due to my ignorance. The trained critic may see in it a value that I do not; but the fact remains that I like it or not according to the impression that the picture makes upon me.

As I have said before, when an intelligent camerist is master of the fundamentals of good composition and technique, he is then in a position to express his opinion of this or that print; and, in many cases, his criticism is just as valuable and helpful as that of the professional critic with a reputation. All of which brings me to the suggestion that the beginner or inexperienced amateur photographer should not be led to depend on others for his appraisal of the pictorial merits of a picture, or whether it should be sharp or "fuzzy." If he sincerely believes that a sharp picture will serve his purpose more advantageously than one that is diffused, let him stick to it; and if he prefers the "fuzzy" picture, let him say so frankly.

In conclusion, let me repeat that I suggest to the beginner that he maintain strict neutrality between the sharp and diffused "factions" until he can make good, sharp pictures. This accomplished, he should consider well the next step and let him not take it under persuasion or influence of any kind, but solely on the firm conviction of his own experience and study.

When all is said and done, *who really cares whether a picture is sharp or diffused, provided that it tells the pictorial story of the subject as it should be told, truthfully and simply?* Let good old-fashioned commonsense temper our opinions, so that we may be neither too conservative nor too radical. Let us have pictures that speak out the real truth about this beautiful and wonderful world of ours, and those who live in it.

A CALIFORNIA RANCH.

P. DOUGLAS ANDERSON.

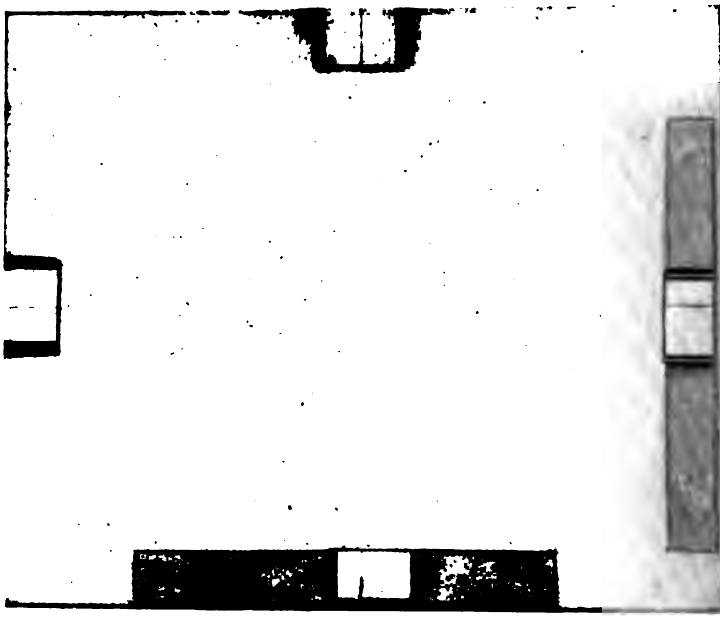


Figure I.
Illustrating article "A Method of Registration for Multiple Printing" by William H. Zerbe

A METHOD OF REGISTRATION FOR MULTIPLE PRINTING

By WILLIAM H. ZERBE

SO much has been written by capable writers in the photographic magazines about Gum printing, that I hesitate to offer anything on the subject, fearing that what I think is new might be an old story to the readers of the *Annual.* However, taking a chance that my method for perfect registration for multiple Gum printing is new, I will endeavor to explain it, hoping some of the newer gum workers will gain some points by reading it.

Figure I is a piece of plain glass somewhat larger than the size of the negative to be printed from. On this glass two narrow strips of glass are cemented to form the angle of a

THE DRINKING PLACE. WILLIAM H. ZERBE.

true square, leaving an opening at the corner which keeps grit and dirt from collecting there. These strips can be cut from an old cleaned negative. The cement I use is called Spittlers Cement, bought in a Woolworth store. Paper or wood strips could be used, but there is a chance

FIGURE 2

of atmospheric conditions swelling or shrinking them, and this must be avoided if we wish perfect registration.

On the sides, top, and bottom paste a piece of gummed paper where the center of the negative will come. Now, draw a line across in the exact center from side to side, and top to bottom. These marks are shown in Figure 1. Figure 2 shows a negative in place in the printing frame, which, of course,

is larger than the negative used to print from. Care must be taken to hold the negative snug against the glass guides. For this purpose I use a small spring shown in the upper right corner in Figure 2.

The paper to be coated should be of a good quality and one

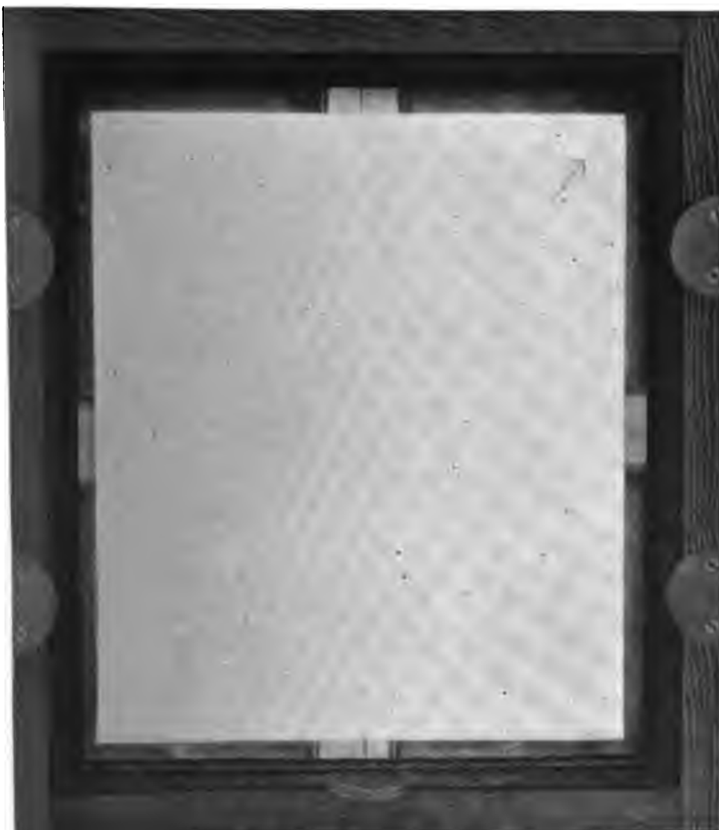


Figure 3.

that does not stretch much. Either before or after it is coated, the back of it is marked off with a T square, making a line about three-quarters of an inch at the edges in the center of sides, top, and bottom. For this purpose I use a drawing-board which has a line drawn across the center from top to bottom, and side to side. The paper should be about an inch larger than the negative, which allows a half inch margin

to facilitate future coatings. It is tacked on in the center of the board face down, and the registration marks are made with the T square. In this way the marks are perfectly square even though the paper may not be. Besides the registration marks it is advisable to make some distinguishing mark so that the image from the first printing will match the negative at future printings, for some times the subsequent coating may cover the first so that the image can not be seen. I make an arrow in the lower left corner.

Figure 3 shows the printing frame with the negative in place, a piece of coated paper face down and the registration marks made to match the marks on the glass with the guide strips and gummed paper registration marks. These must all be kept in place until the back of the printing frame is brought in place, when it is ready for printing the usual way.

After the print is developed, dried, and recoated, all that is necessary for registering is to lay the paper so that the arrow is in the lower left corner and the registration marks again match each other. This can be done repeatedly for as many printings as one wishes to make.

If there should be any stretching of the paper, it will be from the center of the paper and will be distributed four different ways, and will not be noticeable. Unlike the usual method of registering the negative and paper from the corner of the printing frame, the stretch will be from one point in the corner to the opposite corner, and if large sizes there will be quite a noticeable overlapping of the image in the other printings.

It is not my intention to go into details of mixing the pigments and coating the paper for that has been fully covered by able writers in the earlier numbers of the *Annual*. I do, however, think some advice on multiple printing might be in place for those who wish to try it for the first time.

Be sure to select a good quality of paper, fairly heavy and one that does not stretch. A good test is to cut a strip of the paper that it is desired to use, say about twelve inches long and two inches wide, cut it so that the ends are square. Cut this in half so that you have two strips one inch wide. Now, soak one of these strips in water for about an hour, and then dry. Then compare the length of the two. The one that was soaked will be longer if it is a poor quality of paper.

MEZZOGRAPH. O. C. CONKLING.

For multiple printing use a minimum amount of pigment and coat very thin. My own method is to print very strong with a thin coating of pigment so as to get a good impression of the high lights, printing several times if necessary, and when these and the half-tones are satisfactory, I give a heavier coating, that is, more pigment, giving a shorter exposure so that there will remain nothing but shadows from this printing, the high lights having washed away.

Do not use too dense a negative, nor one that is too flat, although with the multiple printing it is possible to get excellent results with this kind of negative, but it takes quite some experience to mix the proportions of pigment gum, and bichromate. To get good results, therefore, I suggest the easiest way for the beginner.

SIDNEY V. WEBB

SCOTCH MIST.

FLOYD VAIL, F.R.P.S.

PHOTOGRAPHING NATIONAL PARKS AND FORESTS

By FRANK A. WAUGH

ALL that has been written, volumes of it, about landscape photography applies to the use of a camera in the National Parks and Forests. At the same time there are important exceptions to be made and special observations which may be of value to the photographer who visits these most attractive fields.

First of all is to be noticed the enormous field offered by these princely possessions. Yellowstone Park is bigger than some of our states, and there are 154 of the National Forests, more than one of which exceeds the state of Connecticut in size. The total area of the National Forests is three and one-half times that of all New England. When we speak, therefore of photographing the National Parks and Forests we have proposed a fairly liberal assignment.

But quality is more important than quantity; and it is not too much to say that for noble and wonderful landscape there is nothing else in the world can surpass the National Parks and Forests of North America, in which group I definitely include Canada.

In fact the tremendous scale on which this landscape unfolds presents one of the primary and most difficult problems to the photographer. The Grand Canyon is a National Park, but anyone who might imagine that the photographic problems in the Grand Canyon were the same as those in Lincoln Park, Chicago, or Schenley Park, Pittsburgh, would be too ridiculous for argument. It is only the simple truth to acknowledge that some of the grandest of this scenery is beyond the reach of photography. In fact it is beyond the reach of painting or of language. The spectacular wonders of the Grand Canyon, the majestic beauties of the Yosemite, the indescribable wonders of the Yellowstone, the somber nobility of the great forests of Oregon, Washington and California, cannot be told in words or picture. Nevertheless they supply the utmost

GRIEF.

Jessie Tarbox Beals.

inspiration for every serious artist, whether he be painter, photographer or poet. On this account the incurable photographer finds it highly worth his effort to visit such scenery, even though he knows it cannot be immediately worked up into picture post cards.

The great diversity of scenery offered in our National Forests and Parks is another point to be emphasized. We have National Forests in the everglades of Florida, on the plains of western Oklahoma, in the White Mountains of New Hampshire, in the Virginia Blue Ridge, in the lake regions of Minnesota and all up and down the western cordilleras from Alaska to the Mexican boundary; and our National Parks are definitely planned to include the most distinct and diverse types of scenery such as the alpine glaciers of Montana, extinct volcanoes, geysers, canyons, waterfalls and the wonderful remains of prehistoric cities. Could a photographer or a painter live for a thousand years he could do no more than make a beginning on the endless program of recording and interpreting the varied scenery of our public parks and forests.

In this connection I should like to say a special word for the National Forests. Quite naturally and properly their scenery is not so widely advertised as that of the parks. The parks have been erected with special reference to the preservation of the most unique and stupendous examples of native scenery. However the photographer well understands that these extraordinary features are precisely the ones which he cannot manage with greatest satisfaction. In order to achieve measurable success he must undertake subjects of less extraordinary size and less extravagant quality. Almost anywhere in the National Forests the photographer will find material amply large enough and sufficiently striking to satisfy all his needs. Another point in favor of the National Forests is that they cover a much wider territory, and are therefore accessible from anywhere. They can be reached by many persons who cannot frequently visit the more famous scenery of Crater Lake, Mt. Rainier and the Grand Canyon. The National Forests are not so much advertised, and a great many persons do not know how accessible they are nor how delightful.

Now, to a great many persons photography is a sport. We hear about hunting with a camera. This usually means going

after moose, deer, and jay birds to steal their photographs by day or night. There is sportsmanship enough about that to be sure; but mountain climbing is also a sporty proposition. So is forest camping or the cruising of mountain trout streams, or paddling a canoe in the Minnesota lakes. On every expedition of this sort the camera must be a companion. It may be a highly incidental accessory and very unintelligently used; or it may be a vital part of the outfit and may yield large returns; it may even be a primary part of the equipment and the photographs which one secures the principal quarry.

Landscape of such boundless extent and infinite variety gives opportunity for every sort of photography. The hand camera will naturally be the first resource of the average traveller, and a good hand camera wisely used will yield very large dividends.

But one may also carry a reflecting press camera. With this he may photograph the half-wild bears of Yellowstone Park and the half-wild cowboys, Indians, sheep-herders, forest rangers and gypsy travellers everywhere in the big country.

Or if one wishes to do what the photographers call "serious work" he will take along his view camera, 5 x 7 or 8 x 10, with tripod, a whole battery of ray filters and every other equipment. He may start in anywhere, and he need not go far until he finds abundant use for all his accessories. Anyone who has seen the photographs of the great Italian explorer Sella, who carries a 12 x 16 plate camera by pack train all through the high mountains of the Caucasus, will be glad that one man has the time, means and ambition to bring the utmost perfection of photography to the service of so noble a theme.

Or again one may wish to use the highly modern moving picture camera. Many successful reels have already been photographed in the National Parks and Forests. Yet only the smallest beginning has been made. A thousand wonders remain untouched.

Finally I would say that the practical problems of photography in the big parks and forests are simpler than we have been given to understand. I have photographed clear across the country from Maine to California and from Canada to Mexico, but I have never found a locality where the ordinary hand camera will not do full service.

We have often been told about the extraordinary intensity

HER JEWEL. LOUIS ASTRELLA.

of light in high altitudes. I think this point has been overstated. One does not need to reduce his exposure very much in working with a hand camera; and anyone who knows how to handle a tripod-camera, with or without an exposure meter, ought never to be at a loss.

Ray filters and cloud filters (I prefer the latter) are highly desirable in the west, in the mountains, at high altitudes, and especially when photographing glaciers and snow fields. Still one can get along without these accessories even on Mount Hood, or in the New Mexican forests. Of course he ought to have a sky filter even on Chesapeake Bay or in Franklin Park, Boston.

One of the most important considerations from a practical point of view is to develop one's exposures about as fast as they are made. It is a great mistake to go on a long trip through the parks and forests and reserve the development and printing of films until one is safely home at the end of the season. It is always desirable to know how the game is going. Various re-adjustments of focus and exposure are desirable, and these can be made only in view of the finished photographs. The stranger going to the parks or forests should, therefore, be prepared either to develop his own negatives as rapidly as made, or else he ought to turn his films over to a good commercial operator and find out at once where he stands.

No one can realize until he has travelled over the big parks and forests how universal our American photographic service is today. I have frequently been to the most remote sections of the United States, but I never yet reached the point where I could not get films developed within twenty-four hours, if it were necessary.

Considering, therefore, the fact that these big examples of scenery in the National Parks and Forests, not to speak of State Parks and Forests, are to be found almost everywhere, that this landscape is beyond comparison in extent and variety, that it presents no unusual or insuperable photographic difficulties, and that a universal photographic service follows one wherever he goes, it would seem as though every owner of a camera of whatever sort, would turn his face early toward these incomparable museums of native landscape.

TWILIGHT. HAROLD K. FREDERICK.

WHEN DRIFTS LIE DEEP. GEORGE W. FRENCH

WINTER WORK

By GILMER WINSTON

MANY camera workers are in the habit of doing photographic work in the summertime, and discontinuing such work as soon as the fall and winter months come on. Anyone who does this will not gain his full measure of pleasure from the use of the camera, and the object of this article is to encourage the use of the camera throughout the winter months.

The ideas expressed here have been gathered from various sources and have given the writer much pleasure. The work

A PLACER MINER'S OUTFIT. GILMER WINSTON.

contemplated is that of making large pictures colored in oil colors, which may be copies of paintings or other colored pictures, or which may be original landscapes colored along the same lines. It is better in the beginning to make copies of colored pictures, for the reason that the color scheme can be followed, thus leading up to original coloring of other pictures.

Of course, it is not contemplated that anyone should make use of copyrighted material without first obtaining proper permission. This should be borne in mind before any pictures are disposed of or allowed to go out of the hands of the maker.

No particular apparatus is needed other than a good ray filter, and possibly a portrait attachment for use with the kodaks. The writer uses a Graflex camera and a No. 3 Wratten filter. For copying material good copies of paintings may be obtained from any art store at a very nominal sum. The first step is to obtain a good clear negative of such paintings. The writer has found that with the use of a No. 3 Wratten filter and a full exposure a good clear negative can be obtained by using the regular tank development with standard Pyro powders. Both film packs or plates give good results, and there is no reason why roll film should not give equally good results, provided the camera is first focused accurately, and the distances marked, so as to avoid focusing between each exposure.

After the negative is obtained an enlargement is made on some paper suitable for oil coloring. The writer's preference is a paper of smooth surface such as Velvet Velox, or papers of similar character. The smooth matte surface papers are also very suitable, though they require more preparation than the hard surface paper. For coloring the following materials should be provided:

A package of Lintine which can be purchased from any drug store for 10 or 15 cents.

A little Megilp or Linseed or Poppy Oil and a small bottle of Turpentine.

In using hard surface papers, no preparation is really necessary. In using the softer papers, it is well to take a small piece of Lintine and apply to the surface of the paper a little of the medium diluted with Turpentine. Then, take another piece of Lintine and wipe off all surplus medium.

AFTER THE SHOWER. Wallace Lumney

The colors necessary need be but few and for experimental purposes, the following will be all that is necessary: Yellow ochre aureolin, cobalt blue, rose madder, burnt umber and flake white. The method of coloring is as follows:

On a small piece of Lintine put a very small amount of color direct from the tube, and rub over the picture wherever color is needed. It is best first for experimental purposes to take just a little yellow and rub into the lighter parts of the picture. Take just a little cobalt blue and rub into the shadows, afterwards blending a little rose madder into this blue, thereby forming a purple for the shadows. The colors can be easily blended on the paper itself and wonderful results can be obtained.

In preliminary work, it is well to follow the color scheme exactly of the picture used as a model. Afterwards this same color scheme can be applied to original pictures of similar character. Some beautiful results can be obtained by coloring in this manner copies of Van Ruisdale's "Mill," and Corot's "Dance of the Nymphs," or well known pictures of similar character.

One need not be afraid of getting a color on wrong, for a piece of Lintine moistened with Turpentine will easily remove every bit of the color so that one can start fresh.

This is work that can be done in the house, and is of very absorbing interest. It is a good method to use in learning to color pictures and it leads to higher things. Probably some of the older artists would turn over in their graves were they to know how the writer obtained a drawing on canvas of one of his pictures, but it was done by reflecting a negative direct on the canvas with an enlarging apparatus, and the outlines of the picture were traced direct on the canvas. The shadows were marked with charcoal. Then, the picture used as a model was placed by the side of the canvas and each stroke as shown in the picture was placed in proper position on the canvas. Some copies of pictures that are obtainable from art stores very clearly show the artists' strokes and form excellent models for such work. Wonderful results can thus be obtained, and an endless amount of pleasure and amusement afforded.

PICTURE TAKING AT HOME

By GEORGE STEELE SEYMOUR

THE American should not seek to take his camera abroad in search of the picturesque until he has first tested the possibilities of his own country. "Snap America First" is a good precept.

In the course of more than twenty years as an amateur photographer—of the raw "button pushing" variety—the writer has accumulated negatives from nearly every state in the Union. The result of all this experience is the old familiar truth that pictures are to be found everywhere; that the north-west corner of your armchair is as likely to yield a prizewinner as some feature of landscape that one travels miles to see. Lines exist everywhere, and if you put them in the right places, why, there you have a picture.

That is all right in theory, but in practice we often need the inspiration of mountains, rivers, the sea and the sky. At the same time that we are garnering our photographic crop, we are enjoying the outing. At the imminent risk of being elected to membership in the Ten Best Club, I shall name as the places that have seemed to me richest in photographic material, the New England coast; New York City; Niagara Falls, where every photographer goes at least once in his lifetime; the island of Mackinac; New Orleans, especially the older and less tidy parts; the east coast of Florida; old Santa Fé; the region around Colorado Springs; Seattle and the places that can be reached from it; San Francisco.

There you are. Ten; count 'em. Why have I left out the Yellowstone and the Grand Cañon and other places where the photographer has to have special lenses and equipment, and has to suspend himself from the side of a precipice? I don't know. It is just my choice. I give it to you without explaining how or why.

Here are pictures from some of these picture places. Niagara is the old faithful; her wonders are ever at the photographer's service. On each visit I find some new region to explore and photograph. Every stone on the Goat and Three

A LANDSCAPE AFTER COROT.

GEORGE STEELE SEYMOUR.

Sisters will give up a picture, while the lower level, reached by stairs and elevator and ruled over by the two Maids of the Mist, presents an aspect undreamt of by him who stays on the heights. Last summer I took my camera for its first visit to that tangle of rocks and overgrowth called the Glen. Not all visitors discover the Glen, but there is a fascination about strolling there; you feel that nature is trying to baffle your attempts at photography. The many nooks and corners are problems in exposure. You will come upon two rocks thrown together by the elemental forces, and the path crowds through the narrow space between them as they lean against each other. How are you going to take a picture of that piece of natural architecture? Try it if you dare, or turn instead to the wildflower growing in a rocky niche at the bend of the path where the sun shines brightly.

But the greatest picture of all at Niagara is the Falls themselves. There is always mist, but also there are moments when the wind blows the mist curtain aside and the water stands out clear. Through showers of spray, on the little boat that pushes close to the danger line, I managed one day to get a shot at the American Fall and the rock at the foot of it that is called after the ages. How many times has this same picture been taken; but will we ever get tired of looking at it?

Like Niagara in its supreme quality as a play place is Mackinac, guardian of the Lakes, an island paradise of water and sky. I do not know any more beautiful sight than the blue universe that stretches out all around you on a clear day. To stand on the palisades amid trees and flowers and gaze out over miles of water, with glimpses of little unspoiled islands and perhaps a tiny village of clean, white houses—this is a city person's dream of paradise.

It is all good picture material at Mackinac, the grand views as well as the tiny details. The air has that transparent quality found in Colorado and other high places. It is clean air and calls for speed and small stops. The clouds are wonderful and you will get them in your negatives if you want them. A sunset behind thick clouds across the water is an interesting subject.

Mackinac is an old fur-trading post, and in the whitewashed fort and quaint village are many picturesque nooks. There is an old blockhouse built back in the blockhouse days, and there

THE ETERNAL. GEORGE STEELE SEYMOUR.

are rock formations, woods and roads winding through them, to keep your camera busy. This is the last remaining spot of earth's surface where automobiles are not admitted. It has long been my ambition to catch a sailboat right under the arch of the Natural Bridge, as you look out from the land side into Lake Huron. It can be done, and what an immense amount of satisfaction one would get out of it!

From Mackinac our pictures fly west. Colorado is the land of sunshine and mountains. To see the mountains properly you must stand on the plains and look off at them. Once you are up among the peaks, you lose the sense of their presence. On account of the elevation and consequent rarity of the air, exposures must be made rapidly. In the ordinary sunlight your anastigmat works at .16 stop and 1/100 exposure. On clouds or distant views you can stop down to .32. The problem is not how to get enough light, but how not to get too much. I usually go to Denver or Colorado Springs and excurt to and from the mountains. Estes Park is a beautiful play ground; the Cañon of the Arkansas and its famous gorge is impressive; at the Springs we are in the shadow of that Peak of Pike's, an unfailing object of interest. Colorado Springs is doing much to redeem itself from the charge that it is devoted to exploiting the tourist; the Garden of the Gods is city property and admission is free to all, while North Cheyenne Cañon, a jewel of great natural beauty, has been fitted at considerable cost with a fine new automobile road which gives many delightful views.

From southern Colorado you can narrow gauge, if you like, down to Santa Fé, the venerable, the historic. Everything here is of a past age, even the little train that brings you down from Antonito, puffing through Indian villages along the upper Rio Grande.

If you would go out to the Indian pueblos, and especially to Taos, as painters are fond of doing, you would find marvelous subjects.

And just to show that this is not entirely travel bureau stuff, I am including in the exhibit a bit of scenery labelled "Landscape After Corot," which was caught amid the smoke and grime of our very practical city of Wilmington, Delaware.

IN THE LAND OF SILENCE.

STEPHEN H. WILLARD.

DESENSITISERS

By MARCUS G. LOVELACE, B. A., Mus. Doc.

IT is only in the last year or so that there has been any real results on the use of desensitisers, although many of the German photochemists and physicists have been experimenting more or less for years. Luppo-Cramer has done more than almost any although some of the early researches of Vogel who was the discoverer of orthochromatism, seem to suggest that he had had some of the results that have given such remarkable results with Dr. Luppo-Cramer.

The possibility of destroying the sensitiveness of an emulsion offers so many inviting possibilities, that the first thought of the process is rather dazzling—think of it—take an exposure, bathe it in a given solution and then develop in daylight. It sounds wonderful, and for many purposes may be of immense value—as far as producing any superior results over the time and temperature method I am inclined to doubt. What is really the action of a desensitiser on the image, of course, no one really knows, any more than they know what a photographic image is itself. One theory seems to be about as plausible as another and as far as proof goes, one is as easy to prove as the other for neither has ever been demonstrated with any reasonable certainty.

The desensitisers are not to be confused with the various red-dyed developers that have had a greater or less vogue in years past. They are true desensitisers, destroying the sensitivity of an unexposed silver bromide emulsion, reducing their degree of sensitiveness to about ½ of 1%—more or less. From all indications the action is due to oxidation products formed in the developer as some developers act in this way if used on unexposed plates. Amidol in particular in a solution of about 1/20 of 1% will reduce the sensitiveness of unexposed emulsion to about 1/200. Tri-amido-toluol will reduce it to about 1/600. Ordinary plates treated in this way may be developed by a bright yellow light without fog. Of course, some of these desensitisers will not work on ortho plates, or panchromatic—some will.

STUDY IN PROFILE. MISS FALES. **Lou Sweet.**

The most remarkable effects, however, have been obtained with saffranine, or rather pheno-safranine, and tolu-safranine, although safranine itself is marketed abroad under various names for the use of the operator in working in bright light. A bath of 1 part of dye in 2000 water used for a few minutes before developing will reduce the sensitivity of ordinary plates to a point where they may be developed by a fairly bright light without any danger of fog. The dye may be added to the developer—or may be used as a preliminary bath—either way being perfectly satisfactory.

The use of safranine in a hydroquinone developer changes its characteristics almost entirely—causing it to behave like metol, the image flashing up and requiring several times the development that it would have required with plain hydroquinone. On the other hand the Watkins factor of pyro is reduced and that of amidol as well. As far as practical operations go, I suppose it is necessary to give specific figures, and I am afraid names.

I have had an unhappy faculty in the last few years of giving names of materials in the *Annual* that none of its readers seemed to be able to obtain, and been forced to answer many letters every year giving addresses of firms dealing in the materials given. This year I am going to say that in every large city there are firms who make a specialty of chemicals and apparatus for laboratory use, and they can furnish any of the materials given in this article. If this will not do and the editor will allow me, I will say that while there are many firms, I have never had any trouble in getting what I wanted through Eimer & Amend of Philadelphia. Pheno-safranine is a red dye, soluble in water and alcohol; for our purposes water is the most suitable solvent, especially in the partly-dry country we live, as most of the alcohol obtainable is unfit for any use, except suicide.

A solution of a strength of 1 gram in 2000 cc. of water, may be added to the developer in use, in the proportion of about 10%. The plate is immersed in total darkness, or by a deep red light and after about half a minute, a bright yellow light may be used for the completion of development. The action of the dye is not that of the old dyed developer, as it produces the same effect if the plate is bathed in the solution, and then well washed to get rid of the dye stain.

It is sometimes rather difficult to get rid of the color of the dye and prolonged washing is often necessary to do so. In case this gives trouble, the plates may be fixed and well washed, and then bathed in the following:

2% Alum solution	1 part
5% Hydrochloric Acid	1 part

Give two or three changes of about two minutes in the above solution and the dye will wash out without much trouble.

Another stain remover—

Sodium NITRITE (not nitrate)	5 grains
Hydrochloric acid	10 drops
Water	2 oz.

Bathe in the above for about four minutes, and then wash for five minutes. Simple washing will remove the dye in most cases and is preferable.

Ilfords of London, market a form of safranine suitable for use with ordinary, ortho, or panchro-plates, under the name of "Desensitol."

Lumiere's have done a great deal of research on this subject, and Lumiere and Seyewitz had a paper in the British Journal of Photography last year giving their results. Many dyes and substances were found which had remarkable desensitising properties—Apomorphine hydrochloride — Aurantia — Picric acid—Indian Yellow—Chrysoidine, and Potassium Chromate.

When it is not required to examine plates by transmitted light, such as autochromes, a 1% solution of picric acid—a 1 in 2000 solution of chrysoidine, or a 2% solution of neut:al potassium chromate may be used for about half a minute in the dark—obviating the staining qualities of safranine. The plates after bathing may be developed about five feet from a candle. The above mentioned desensitisers may be used with bromide paper which is so badly stained with aurantia or phenosafranine that it is almost impossible to remove it.

Now for some developer formulæ. First an old friend.

A	Sodium sulphite	100 grams
	Hydroquinone	12 grams
	Potassium Bromide	1 gram
	Water	1000 CC
B	Potassium Carbonate	50 grams
	Pheno-safranine (1:2000)	200 CC
	Water to make	1000 CC

ALLEY SILHOUETTES. PETER G. PETRIDIS.

Use equal parts, A & B. This is a very quick soft working developer much resembling metol.

Paramidophenol

Potassium metabisulphite	50 grams
Paramidophenol hydrochloride	20 grams
Potassium Bromide	4 grams
Water	125 CC

Dissolve 70 grams pure caustic potash in 90 cc of water, and when cold add slowly to the first solution—much heat is developed and the two solutions should be mixed *slowly*. To each 200 cc of the completed mixture should be added 10 cc of a 1% solution of phenosafranine. The mixture will be turbid, and must be shaken well before using. One part of this mixture should be diluted with about 20 parts water for use.

Metol hydroquinone developer (single solution) with about 10 cc of pheno-safranine solution (1:2000) to each 100 cc. of developer will work perfectly, and will keep very well if kept stoppered.

Some persons are troubled very much with working in the dark, even with the modern methods of illumination, and while time and temperature will do better work than any man can do—(in the final average of his work) many of us like to see the plate in the developer and detest a red light, or begrudge the time that it takes for the retina to accommodate itself to a grey-green safe light. For these the new method should prove something well worth while. I have not tried it on Autochromes, but from the foreign journals, it works well, and should be a real boon to those who work with this most fascinating of all plates.

O. C. CONKLING.

A PHOTOGRAPHIC KITCHEN CABINET

By F. R. SEAVEY

LIKE most amateurs I had always been obliged to perform all my photographic work on the kitchen table, or in the bath room, with all the attending inconveniences, storing apparatus and supplies in various drawers, trunks, and closets; the whole operation entailing much time consuming labor in hunting up the various apparatus and preparing for operations, and afterward in packing things away again; not mentioning the inconveniences to the other members of the household.

Like most other aspiring amateurs, I always longed for the day when I would have a room all to myself, a day which never seemed to come. I had often noticed the great convenience which the modern kitchen cabinet is to the house wife, how she can perform all cooking operations without leaving her seat on the stool with all her paraphernalia within easy reach before her, and the thought came to me why not a photographic cabinet along the same lines?

From the lumber of some packing boxes I built the cabinet shown in the illustration (Figures 1 and 2); four and a half feet long, six and a half feet high, with the table top or working surface 30 x 54 inches in size, and at a height convenient for work standing or seated on a stool. While not handsome as a piece of furniture it has proved very useful.

Referring to the illustration, the cupboard on the right above the table top contains, scales, graduates, chemicals, etc., and from this section all solutions are compounded. On the inside of the door are pasted all the formulæ which I regularly use. This compartment has a tight partition separating it from the other compartments to the left, and has ventilating holes in top and bottom, so that any chemical fumes which might accidentally get loose will not penetrate the other compartments and damage materials there.

The lower compartment on the right contains trays, tanks, etc., and is likewise ventilated. Thus, all wet operations are performed on the right-hand end of the working surface.

Figure 1.
Illustrating article "A Photographic Kitchen Cabinet," by F. R. Seavey.

The remainder of the space above is not divided, but is one large compartment with double doors. Here are kept paper, films, printing frames, trimmer, and the thousand and one things which accumulate, which the amateur considers indispensable and wants kept where they can be found without delay.

The large double compartment below to the left holds the

Figure 2.

enlarging camera, tripod, camera, and all bulky packages such as stock of mounts, etc. All of the compartments have shelves spaced to accommodate the various articles.

A removable partition divides the working surface into two parts. Developing and other wet operations are performed on the right-hand end, the partition preventing any spatter from reaching the dry operations on the left end; for while

A NORTHERN SUNSET. J. A. SINGLER.

the careful workman does not splash his solutions about, accidents sometimes happen, and with a few old newspapers under the trays and this separating partition, an overturned tray is not likely to cause the regrets which follow the loss of cherished negatives or other materials.

In the left-hand part of the working top is a removable section where the printer fits in. This is an Ansco Amateur Printer which has had the original single lamp socket replaced by two sockets, and the box lengthened out so that the lamps are at a sufficient distance from the negative to secure even illumination. Two 75 watt bulbs are used for slow printing papers, while smaller bulbs are substituted when working more sensitive papers. This arrangement gives all the printing speed that the amateur needs. The printer is held rigidly in the opening in the table top by two small L shaped pieces of thin iron screwed to the printer and thumbscrews passing through them into the under side of the table top; the removable section of the table top being secured in place in the same manner when the printer is not in use.

Above the working surface are four electric light key sockets on a wire circuit which is connected to the electric fixture in the center of the room by a removable plug on a flexible lamp cord. To these sockets various lights and devices are attached. To the one on the left, the printer, or when using a printing-frame a 100 watt bulb; in the next socket generally a 25 watt frosted bulb which is switched on when a white light is desired on this end of the table, for such uses as examining negatives, adjusting masks, etc. In the next socket, which is near the center of the working surface, is a ruby bulb when needed, or when printing ordinary papers a shaded bulb with orange paper over the bottom of the shade.

This light and shade are supported by a small rod passing through a small pivoted block on the underside of the upper compartments. This rod can be pushed in or out and swung from side to side, thus bringing the orange light above any part of the working surface. In ordinary printing operations this light is adjusted right over the dividing partition so that it illuminates both sides, and being shaded it casts the light downward where it is needed and not into one's eyes. The fourth light socket on the right carries a 25 watt frosted

LAKE GEMESCAL. EDGAR A. COHEN.

white bulb, and being over the hypo tray comes handy to have a look at the prints while in the trays.

When making enlargements, a homemade enlarging camera is clamped by thumbscrews to the door of the upper compartment on the left, and shoots downward, the sensitive paper being laid on the table top and held down by small weights on the edges of the paper.

The entire upper part of the cabinet above the table top can be removed by taking out a few screws, this making it easier to handle in case it is necessary to move it to another room, while large wheel casters make it easy to move for cleaning or sweeping under. The entire cabinet is painted with white enamel both inside and out, thus being easy to clean.

While such a cabinet lacks the advantages of running water, it being in a room next to the bath-room, it is but a few steps to the water faucet, and the prints are usually taken into the bath-room for final washing.

The great advantage of the cabinet is that it keeps all photographic goods together ready for immediate use without the loss of much time in preparation and cleaning up after operations, and occupies only a small space, thus leaving the balance of the room to be used for other purposes.

W. T. STARR.

ENCHANTING TOWERS. IRVING BERKEY.

THE CARBRO PROCESS

By NOËL G. BREEZE

AT the present time when the art side of photography is at last beginning to receive such well merited attention, many serious workers are looking around for a process which will allow them to give full rein to their artistic abilities.

Many workers have realized that in Carbro they have at hand a process which will allow them to indulge their ideas in full, which is simply a method of making Carbon prints without the bother of printing with an Actinometer extraordinarily simple to work and also comparatively cheap.

The working details are as follows:

A bromide print is taken and soaked in water. Prints on a smooth matt surface give the best results, and it should be remembered that wherever the term bromide·print is used the same remarks apply equally well to gaslight papers.

A piece of insensitive Carbon tissue is taken and soaked in the following baths:

No. 1. Stock Solution		No. 2. Stock Solution	
Pot. Bichromate	1 oz.	Formaldehyde, 40% .	22 ozs.
Pot. Bromide	1 oz.	Glacial Acetic Acid ..	1 oz.
Pot. Ferricyanide....	1 oz.	Hydrochloric Acid (pure)	1 oz.
Water to 20 ozs.			

For use take No. 1 6 ozs. water 18 ozs. No. 2 1 oz. water to 32 ozs.

The two dishes containing the two working baths are placed side by side, and the tissue placed in the first bath for 3 minutes exactly, lifted out by the corner and allowed to drain for 15 seconds. It is then transferred to the No. 2 bath, and the time in this bath is governed by the results desired. The longer it is in, the softer will be the finished results and vice versa, so that if we are working with a very hard print and require a softer result, all that it is necessary to do is to give a longer immersion in the No. 2 bath.

The minimum time is about 8 seconds; the maximum about 30 to 35 seconds. If this second bath is omitted altogether it

LUCILE. MACAVOY SISTERS.

will be found that the finished print is so heavily clogged as to be useless.

The tissue is taken from the No. 2 bath and placed on the bromide print. The bromide print must be previously placed face upwards with plenty of water on the surface. As soon as the Carbon tissue is brought into contact with the bromide print care must be taken that it does not slip, and it must be squeegeed firmly into contact with a flat squeegee as soon as possible.

This operation of squeegeeing into contact is best done on either a piece of glass, or on a special board for the purpose which has been varnished with a good transparent waterproof varnish.

The two are left in contact for from about 12 to 20 minutes —about fifteen minutes being a good average working time.

When they have been in contact for about twelve minutes a piece of specially prepared support paper is taken, soaked in water for about two or three minutes, and placed face upwards on another piece of glass or board.

The bromide and carbon tissue in contact are now taken from the squeegee plate, and the carbon tissue stripped away. The Carbon tissue is then placed on the support paper and firmly squeegeed into contact. It is then placed between blotting boards and left for about half an hour under just *sufficient weight to keep it flat.* Great pressure besides being undesirable is also inconvenient. The bromide print at this stage may be placed in a dish of water to wash and left until we are ready to deal with it.

The next stage in the process is the development of the Carbon print, and for this all that is required is a kettle of hot water. A fairly large dish should be selected, as this gives plenty of room to work, and greatly facilitates the work. The exact temperature of the water is immaterial, but it should be somewhere about 110° F. If at all doubtful start with the water too cold, as it is quite easy to warm it up, whereas if it is too hot, frilling and blisters will probably result.

The tissue and support should be placed in the dish well under water and allowed to remain so for about ninety seconds. It will then be seen that the pigment is oozing all round the edges of the print, after about another thirty seconds the

SHEEP IN THE BERKSHIRES. C. R. Phipps.

backing paper can be stripped bodily off, leaving all the pigment adhering to the support paper.

There are two alternative methods of development in general use; the first and, in the writer's opinion the best, is to lay the support paper face downwards on the surface of the water and gently draw it backwards and forwards on the surface of the water. Continue this as long as any pigment continues to wash off the surface of the print. When no more pigment will wash away the picture is developed. The other method, which may be preferred, is to lay the print face upwards on the surface of the water and gently splash it with the one hand whilst steadying it with the other one. Considerable control at this stage can be effected in this manner.

After development the print should be allowed to stand face downwards in a deep dish of cold water for about five minutes to thoroughly discharge any undissolved pigment. It may then be either treated with an alum bath, or not, according to the taste of the worker. Treatment with an alum bath discharges all the potassium bichromate which may be left in the print and renders it absolutely permanent.

Perhaps at this juncture a few general hints on the manipulation at the various stages may not be out of place.

To begin with, whenever doing any squeegeeing, always use a flat squeegee, as the use of a roller squeegee, except in the hands of an expert, tends to make the pigment deposit in waves across the print, instead of an even distribution all over. It is also a good plan when sensitizing the tissue in the first place to press the tissue firmly down on to the bottom of the dish in the No. 1 bath, immediately lifting it up again and well rocking the dish until it becomes limp, thus preventing the formation of air bells on the print.

Air-bells, or small air bubbles, are very liable to occur unless precautions are taken, and to have to spend time in spotting out some hundred minute flaws is, to say the least, a great inconvenience.

The easiest way to prevent these occurring is to splash plenty of water on to both the surface of the bromide and the support paper at the various stages. It is obvious that if there is plenty of water on the print that, as the squeegee moves across, it will take the water with it, and that this will at

the same time move any small bubbles along with it: if there is not enough water there the bubbles will simply be flattened out between the paper and appear as small white spots in the finished print.

With regard to the length of time for soaking the final support paper, there are a great many different opinions on this, but the writer has always found that even with the heaviest support papers only about three or four minutes at the most are necessary.

A very good method of preventing slipping during the operation of squeegeeing the Carbon tissue into contact with the bromide is to have a hinged flap on the board fitted with a piece of rubber along the edge. This is just pressed down along the edge of the print and holds them firmly during the operation. Care must, however, be taken to see that it is not pressed down too hard, or surface markings due to the weight will appear on the finished print.

It should be clearly understood by the worker that in the first operation of sensitizing the tissue that absolute adherence to the time given for immersion in the first bath, namely three minutes, is essential, and no mistake must be made over the fact that it is in the second bath that the time must be varied to obtain control.

The bromide print, which is still in a bleached state may now after it has been well washed be redeveloped. For this any non-staining developer may be used such as Metol-Quinol, Amidol, etc. The redevelopment must be very thorough, fifteen minutes at least, otherwise succeeding Carbro prints will lack detail. In fact if the redevelopment has been very short it may not be possible to obtain any further Carbro prints from the bromide. Any number of prints may be made from the one original bromide without any loss of detail, in fact the writer has one in his possession from which some forty-five prints have been made during a period of two years, and the bromide is still in perfectly good condition.

The length of life of a working bath is always a matter of interest. The life of the No. 1 bath is practically indefinite. After it has been in use for some time it will probably give a very harsh print; this is a sign that it is exhausted. The No. 2 bath should be renewed very frequently as the constant

A BIT OF THE ANDROSCOGGIN. W. T. STARR

additions of potassium bichromate to it from the No. 1 bath soon exhaust it. As a rough guide about six to twelve whole-plate prints will exhaust a 32 oz. working bath.

Those workers who have been in the habit of working the old Carbon process will be quick to appreciate the enormous advantages for many reasons, the chief of which is that it does not matter what size of Carbon print is desired, all that is necessary is to make an enlargement of the required size and to make a Carbro print from this in the manner described.

Another advantage which cannot be too strongly emphasized is that the old and troublesome double-transfer process is entirely done away with. The reason for this is obvious. When the tissue is placed in contact with the original print it is transferred one way, and when in its turn the tissue is placed upon the support paper it is transferred again, thus making a double transfer. Only those workers who have tried double transfer work and spoiled an otherwise good print at this stage will be able to appreciate the advantages of this to the full.

An easy way of securing local control is to have by the side of the developing dish a small jug containing water which is practically boiling; with this any part of the print which it is desired to lighten may be treated by dipping a piece of cotton wool, or a sponge, into the jug and directing a stream of hot water on to the part which it is desired to lighten. Another method of lightening heavy shadows is to gently brush them with a *very soft* artist's water-color brush dipped in the jug of hot water. It is only a matter of time before the worker can practically make the finished result just what he requires.

In conclusion the best advice is to follow the instructions exactly until you have absolutely mastered the working of the second bath. Do not start experimenting until you have grasped the main details; when you have done this the rest is easy.

After a short time it will be found that you can produce just the result you want by means of this fascinating process, and from a pictorial point of view these are unsurpassed. For one thing the results have a magnificent quality which no other process can give, and for another there is a choice of some thirty-six colors, so that the color may be suited to the subject.

PRIDE OF THE RANCH. LOUIS FLECKENSTEIN.

TODAY VS. YESTERDAY

By C. H. CLAUDY

AMONG my earliest recollections is having agreed with my parents to save up my pennies to buy a Kodak. The Kodak of those days cost twenty-five dollars (about equal to seventy-five now), and for a boy of ten to agree to save up to buy it was an insane promise! I realized this more and more as the months went on, and the fund grew so slowly it hardly could be seen to sprout!

I suppose I should be saving up for that Kodak yet, if some one had not taken pity on me and given me a camera!

The camera (this was thirty some years ago!) had a single lens, working, I suppose about F/16, used dry plates, and I printed on albumen paper, toning in a gold bath. It used to take about three weeks to save up money enough to get a minute vial of gold chloride, I remember!

Well, in after years I owned other cameras, even Kodaks. I watched the process of manufacture change from the first clumsy film instruments at large prices to the modern fool proof Brownies and Kodaks at next to nothing in money. I watched the albumen paper give way to Solio, Solio give way to Velox and Velox change from its early difficulties to its fool-proof present.

Twenty years ago I tramped the country with a heavy camera and many dry plates. Twenty years ago there were films and Kodaks, of course, but a lot of us refused to be educated to the point where we either could use, or believed we could use, the simpler, lighter apparatus to the same good effect that we could the heavier, older styles.

Now, of course, I would no more think of carrying around an eight by ten with loaded holders than I would think of trying to race on a bicycle against a motorcycle. The heaviest outfit I ever carry now is a Graflex, and that is one of the smaller film models.

I dare say you are about ready to give up in despair and turn to a story with more point, so I hasten to introduce the point of this one.

LITTLE BROTHER. C. A. TELFER.

So many people have written about the convenience of modern photography; the ease of carrying Kodaks and films and the lack of effort required in development and printing, as opposed to older days and older methods, that the photographic world is pretty well convinced that the great boons of pocket Kodaks and roll films is one of muscular saving and surcease of trouble.

I think we miss the point when we put the emphasis here; to me, the great advantage of the modern system of photography as worked out for the amateur, the vacationist, the pleasure seeker, the historian and the traveler, is not a matter of *muscle* but of *mind.*

We have been freed from the mechanics of our art. That leaves us free to put our entire attention upon the art. In olden days the traveler from New York to Boston faced a difficult, dangerous and tiresome journey by stage coach. His thought was for pillows and rugs, something to eat, a gun for protection. He had little time or inclination to spend upon the object of his journey until it was accomplished. Today the business man gets on a train, dictates his mail as he goes, sends telegrams *en route,* and hardly knows at the end of a few hours that he has not been at home in his office. He has been freed from the mechanics of his journey, and his thought can all be for the object of the journey.

The object of the photographic journey which a roll of film makes, through Kodak, developing tank, printing frame and chemical baths, is to produce a picture. If all our attention is concentrated on the means, we have little for the result. Look at the photographs of thirty years ago, and see the contrast with those of today; they are, many of them, perfect as photographs, and with the same pictorial appeal as may be possessed by an architect's drawing of the floor-plan of a storage warehouse!

Look at the vacation photographs of today as compared with those of yesterday. Then, we had stiff groups, laborious compositions of country hotels with John and Katherine holding hands on the "piazza." Today we have little intimate pictures, walks, rides, picnics, the evening fire, the ukulele tormentors, the beach party, the bathing suit romp, the tennis or golf game. Our vacation pictures are informal, human,

IRISH THATCHED COTTAGE. Josephine M. Wallace.

unposed, vital and alive with interest. True, many of them are sadly lacking in art quality as judged by the standards of the hanging committee in the exhibition. But they should not be so judged, because not made for that purpose, or to meet the serious competition of those who use camera in place of brush.

The pocket Kodak is a servant; the old camera was a master, aye, a task master. The roll of film and the tank have taken the drudgery out of photography. They have left it all its interest, all its spontaneity, all its intriguing pleasures, while laying away for good not only muscular effort, but mental bother with matters of physics and chemistry.

But they have not in the least removed a single one of the art possibilities of the photograph from within our reach; rather have they added to them by such means as orthochromatism, lack of halation, speed and simplicity.

Therefore, I, who can look back upon a more or less honorable length of service to the goddess of red light and sensitive emulsion, feel that some one should sing the real praises of the modern improvements of the art, and emphasize not so much the ease of body, and the lack of muscle strain of a roll of film and a pocket Kodak, as their striking from the mind, the shackles of difficulty, trouble, failure and sluggishness of working, which were concomitant with slow dry plates, heavy instruments, sunlight printing and heavy and sluggish lenses, all expensive and none efficient in any but highly skilled hands.

Figure 1.
Baby Pelicans.

Figure 2.
Black Skimmers Over Nesting Ground.

THE VEST-POCKET CAMERA IN WILD LIFE PHOTOGRAPHY

By STANLEY CLISBY ARTHUR

IN the realm of nature photography, a kingdom of pleasure and interest where one can imagine only the reflex and the long focus lens being useful, there is a special place for the miniature of the camera family—the modern and commonly-called, vest-pocket picture taking machine.

In spite of the size of the picture it makes this erroneously styled "vest-pocket" (as a matter of fact most of us do not wear vests, especially in summer, which is picture taking time, and, besides, these species of cameras wouldn't fit a vest pocket if we did wear 'em) camera can and does make useful and valuable nature pictures.

I have in my collection of several thousand negatives of birds and mammals several hundreds of prized exposures on roll film that were made with an Icarette A fitted with a compound shutter and a Beck Mutar lens working at F.4/9, of 3-inch focus, that takes a 2¼ x 2¼ inch image.

I have used this camera from Louisiana to Labrador for making plain record pictures, long distant "shots" and "close-

I   2

3   4

5   6

1. Baby Terns Taking to Water.
2. Wapite or Elk Photographed from Horseback.
3. Brown Pelicans in Flight Over Nest.
4. Black-crowned Night Herons.
5. Nest and Eggs of Night Heron.
6. Wapite or Elk Stalked and Photographed from Horseback.

Illustrating article "The Vest-Pocket in Wild Life Photography," by Stanley Clisby Arthur

ups." I have "stopped" black skimmers on the wing, pictures that show something more than infinitesimal specks against a sky; baby birds on their nests, ducks in the water and in the air, elk wandering through the thick underbrush of their habitat, wary denizens of the wild that had to be stalked on horseback into camera range. High on a tree top I have set this baby of the camera world on a kodapod, focused it on a nest and, from the ground, by the pull of a thread, pictured rare domestic bird scenes that could be secured in no other fashion.

If the proof of a pudding is in its eating, proof of a wild life camera is in the resultant prints or enlargements you show your friends. Wherefore, I offer, as evidence of what a miniature camera is capable of doing in the realm of wild life photography, the accompanying contact prints. To really appreciate what a camera of this size can do enlargements to 5 x 7 or 8 x 10 should be inspected, and, for that matter, I have some exceptionally fine bromides measuring 11 x 14 that were taken from a portion of the 2¼ x 2¼ negatives.

As to the merits of the different members of the small camera family I find, after experimenting with them all from the 1⅝ x 2½ to the 3¼ x 4¼ size, that the most useful and all around valuable miniature camera is one of the 2¼ x 3¼ variety, equipped with a good anastigmat (F.4/5 is not an absolute necessity, although it is a dandy reserve force to always have at hand). A shutter capable of 1-300th down to 1 second, a kodapod or an octipod, a self-tripper, self-timer, time-valve (call it what you will) and a spool of tough black thread should be included with all outfits.

With such an equipment you can do a lot. True, the short 3- to 4-inch focus of the lens will not get you large images of birds, or other objects, at a distance, but they will get you images nearly the size of the film used if you entice your subjects into proper range.

Two of the finest bluebird photographs I have ever seen were taken by a lad in the Louisiana pine woods with a 2¼ x 3¼ vest pocket Kodak. He discovered the nest where the parent birds were rearing a mighty hungry family. He tried stalking, creeping up on the nesting site so as to snapshot the devoted two bringing countless worms for four ever-open throats. He got nothing after three whole days of hard work.

THE PATRIARCH. DR. C. F. RODGERS.

Then he took a tip from an experienced hand at the game. He drove a stake into the ground within less than three feet of the nesting stump the bluebirds called home, attached the Kodak to the stake and focused carefully on the top of the stump. To the compound shutter he attached a thread and hid behind a bush 25 feet away.

He pulled on his thread six times in less than twenty minutes and when he rolled up the film he knew he had six perfect pictures of parent birds bringing food to the voracious family hidden deep in the stump. When he developed the film he proved that his guess of six perfect bird portraits out of six yanks on the thread was correct.

Intelligent use, and a complete realization of the size of the image being secured, will work wonders getting the right pictures with the vest-pocket camera. This camera is now occupying the place predicted for it just a few years ago. The cost of a suitable lens working at a large aperture is now not out of reason, or the reach of the pocket. There is a saving in weight, size and the cost of negative material, and an added convenience in having a camera with you all of the time. In the open I am never without mine, carrying it in a holster attached to my belt in which is carried, beside the camera, six rolls of film, a self tripper, a kodapod and a spool of thread.

Depth of focus is an added value to the small camera. It bears a most important relationship to the focal length of the lens. The diameter of the circle of diffusion at any point in the image is directly proportionate to the square of the focal length. The blur resulting from the use of a lens of 7-inch focus at any given aperture will be four times the diameter and sixteen times the area of that given by a lens of 3½-inch focus at the same effective aperture (or the same relative F. value), and for very near objects the difference will be greater.

Therefore, by the use of the short-focus lenses supplied with the modern vest-pocket cameras (3½-inch lens being found on practically all the 2¼ x 3¼ cameras) we increase to a most remarkable extent our power of securing, and with comparatively large apertures, negatives in which the images of *all* objects, whether near or far, are rendered in sharp focus.

If a print from the smaller negative is enlarged to the same

THE CLOUD. EDGAR N. POOLE.

size as a picture secured from the lens of 7-inch focus, or if enlargements are made from both negatives so that the resultant pictures are of exactly the same linear dimensions, the bromide from the vest-pocket negative will be markedly superior to the enlargement from the larger negative, especially in regard to the unpleasant blur in the foreground or background objects that were not rendered sharp.

But the vest-pocket camera, exceptional piece of modern mechanism as it is, cannot perform miracles. The silver grain of the photographic emulsions now supplied us prevents this.

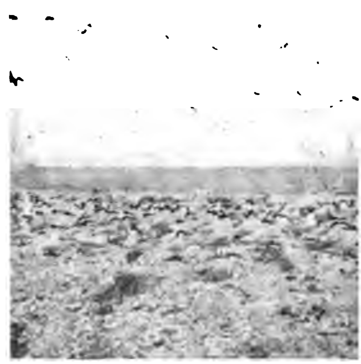


Figure 3.
Cabot Terns in Flight.

Figure 4.
Brown Pelicans Nesting Colony on Mudlumps, Mouth of Mississippi River.

It will be found that when you have secured a negative of a large negative, that is, an object that is large in proportion to the area of your film, it will enlarge to almost gigantic proportions, whereas a negative that may be "sharp as a needle," but which contains a multitude of small objects, will prove a miserable failure when "blown up."

In the accompanying examples of what an Icarette will do in the wild life field, the close-up of the baby pelicans on their nest (Figure 1) will make a satisfactory enlargement, while an enlargement from that of the black skimmers (Figure 2), or the flying Cabot terns (Figure 3), or of the pelicans on the mudlumps (Figure 4), will be blurry and grainy. Some day, when the film manufacturers give us the prophesied "grainless" emulsion, then will the miniature camera make "miracle" pictures.

CURLY LOCKS. Merle Boyer Studio.

In the small camera there is the advantage of exposure to be considered. The short-focus lens will allow us to stop motion with a 1-300th, or even a 1-200th, that will "freeze" moving objects that call for the 1-1000th of our focal plane shutter on our 4 x 5 Graflex. This shortening of exposure allows us, who use the vest-pocket camera, to shoot pictures at F/11 and secure full exposure and an added definition at the same time, something that is not possible with the longer focused lenses.

In use I practice making pictures with a small camera at F/11 with a shutter set at a 1-25th exposure, and the result is a series of uniform negatives. Should there be movement of the object being photographed I use 1-50th or 1-100th, opening up slightly to compensate for the extra speed. Should it be the photographing of something in flight the lens is used at full aperture of F.4/9, and the shutter set at the 1-300th maximum.

While not successfully competing in every way with the Graflex, and the long focus lenses of the wild life photographer's outfit in *all* things, the vest-pocket camera has its place in the ever growing field of nature photography, and should be a part of every cameraman's equipment when he hies himself to Nature, and endeavors to record her many creatures.

B. F. LANGLAND.

Figure I.
SKULL OF AMERICAN ANTELOPE.
Illustrating article "Photographic Selections for 1923," by Dr. R. W. Shufeldt.

PHOTOGRAPHIC SELECTIONS FOR 1923

By DR. R. W. SHUFELDT

DURING the past year my work in photography has been of an unusually varied character, and of subjects illustrating many departments and fields in which the camera comes into play. Upwards of an hundred of my pictures have been published by the American Forestry Association in its elegant publication *American Forestry*. Most of these illustrations are of a class that appeal, in one way or another, to our foresters, to naturalists, and to students of nature in the open.

Having published hundreds of osteological plates and secur-

Figure 2.

A STATELY WHITE HOLLYHOCK.

Illustrating article "Photographic Selections for 1923," by Dr. R. W. Shufeldt.

Figure 3.

MAGNOLIA BUDS.

ing the illustrations by cameras of various sizes, a few words on the matter of backgrounds may come in here. As a rule, if properly prepared, the skulls and other bones to be figured are nearly pure white; but this is not always the case, for they may be from a very pale to a rather deep ochre. Many years ago I photographed a long series of bones of fossil birds, and the specimens were a dull black—in a few instances a shiny black, with a few an earth brown. So much, then, for the colors of the objects we have to deal with; but they will

A STUDY IN BLACK AND WHITE. DR. R. W. SHUFELDT.

have everything to do with our decisions in the matter of backgrounds to be selected. Next comes the question of lighting, and here we must consider its direction and source. It may be sunlight of varying intensity coming from overhead; from a window on one side or on both sides, and so on. Then a powerful electric light may be used as coming from any angle; but personally I have not obtained, with this class of subjects, as satisfactory results as where sunlight has been employed as the illuminating medium. Whichever is used, however, one should invariably secure full lighting values, and get rid of shadows and brilliant areas on the background by the use of a reflector. For this purpose I employ a thick piece of pure white cardboard, about two feet by fifteen inches. This is held vertical to the rays of light lighting the specimens, and turned about until the light reflected from it and thrown upon the specimens produces the maximum amount of illumination, to the point of killing all shadows possible and minimizing the high lights. When all arrangements are satisfactory, the bulb to your shutter may be pressed with your unemployed hand and the exposure duly made.

Bones having various shades of color, all the way to include black, will give no special trouble when all the factors entering into the operation have been scientifically handled; but the case is quite different with chalk-white bones, and the point to be considered is whether pure white backgrounds or dead black ones are the best to bring out all the details of the specimen or specimens being photographed. This is a subject I have discussed with many authors who illustrate their writings as I do with plates, the figures on which are reproductions of various subjects obtained by means of photography, and I find not a few opinions entertained in the premises. Should a pure white background be employed and the side-illumination not skillfully handled, more or fewer of the shadows of the white bones being photographed will, on the background, run in with the shadows caused by the elevations and depressions on the bone itself, thus killing the true outline of the subject. Through careful observation, this very serious defect can be wholly obviated, and in the result any particular white bone may be made to stand out in such a manner as to have the appearance of the original placed on a sheet of white paper.

Figure 4.
PASTURE THISTLE AS IT GROWS.
Illustrating article "Photographic Selections for 1923," by Dr. R. W. Shufeldt.

With entirely black backgrounds the difficulty becomes greater; and so, as a rule, the white ones are to be preferred.

It is well to know that certain shades of orange (very pale), or tan, or pink, in the case of photographing pure white objects to be reproduced as plates, often give fine results under proper precautions; but space will not admit of my further discussing this important point in this place, especially as I may take it up in another connection. A properly photographed skull is here shown in Figure 1; it is from the almost extinct American antelope, and I made the picture from a United States National Museum Specimen.

Often our best known and most abundant garden flowers are fine subjects for photography, and one I secured of a common hollyhock, reproduced in Figure 2, forms a good example in illustration of this. There is not a little in this picture for young botanists to study, as considerable detail of flowers, buds, seed-pods, and leaves are in evidence.

An example of a single subject showing the complete lighting in the case of a flower is well shown in Figure 3 which presents a reproduction of one of my photographs of magnolia buds. The color here was cream white slightly shaded with a reddish-purple, and the uniform lighting was secured by the use of the cardboard reflector described in a former paragraph.

Some of the most attractive flower pictures I have taken have been those secured in nature—just as they grow, and an excellent example of these is the old Pasture Thistle here reproduced in Figure 4. The scene was in an abandoned and overgrown field lying between two copses of mixed trees of no great height. Other thistle-plants are seen growing in various places, while many milkweed butterflies are lazily and in hesitating flight passing from one flower to another. Two of them are enjoying themselves on the plant in the foreground, and the one seen on side view is readily recognizable. This picture was secured with my Voigtlander lens, and an instantaneous exposure with an extremely small stop. Time: midsummer on a very clear day.

THROUGH THE ARCH, WASHINGTON SQUARE. G. W. HARTING.

PHOTOGRAPHY OF THE STAGE

By FREDERIC FELIX

IN the late 80's—or thirty years or more ago—the newspapers and periodicals did not receive market basket donations of theatrical photographs, as is customary in these days. At present, nearly every publication has almost to run away from the profusion of photography offered in the managerial hope that some of the players' likenesses, or the stage views may be used, thus to extend the publicity work so valuable in making Broadway offerings the successes desired at the hands of the public. In the old days of a generation or so ago, the publication enterprising enough to wish to include stage pictures had to send an artist to make a sketch of the scene. Stage photography had not begun to make itself effective, and there was a great distance between the line drawings of those times and the present perfection of reproduction both as it is carried out in photography and in printing in the publications.

It is interesting to note that the pioneer of present day stage photography remains active in a New York studio, and that, while not devoting most of his time to the stage, as he did years ago, he still goes out occasionally to make a few views in the theatre for some special friend or old time patron. The gentleman is Joseph Byron, and he is the recognized patriarch of stage photography. He came to New York thirty-three years ago from Nottingham, England. In his native town he followed the photographic footsteps of his father and grandfather, the studio activity of the family extending back to 1851. In New York Mr. Byron is giving way to his son, thus extending the work into a fourth generation.

Mr. Byron made a photograph March 10th, 1863, in Nottingham, that was the forerunner of all present day flashlight work. It was during the progress of a bullock roast, celebrating the wedding of the Prince of Wales, who became King Edward. He used magnesium ribbon or wire and, when ready for his exposure, threw a quantity of it into the barbecue fire,

HENRY IRVING PLAYING DANTE.
Illustrating article "Photography of the Stage," by Frederic Felix.

producing a great flash that startled the assemblage and made everybody talk of the affair. He was sixteen years of age at the time and quite an experimenter. His grandfather approved the idea, and offered to finance him in any further experiments he would wish to make. He promptly availed himself of the encouragement and was able, in succeeding years, to move flashlight work along rapidly, and also to keep his particular part of it well individualized.

Before leaving England Mr. Byron used flash powder successfully in a number of stage exposures, but he did not attempt to specialize in the work. Soon after coming to this country, however, he took it up actively and for fifteen years or more was practically the only operator depended on for such reproductions. Nothing of the kind was being done in this country before his arrival.

From the earliest attempts, through all his successful years, Mr. Byron has used only pure magnesium. He made scores of attempts to vary the composition, to no advantage.

Among his first photographs in this country of the stage set with scenery and filled with players, were those he made of "Blue Jeans," about 1889, under arrangement with Daniel Frohman. The work was so successful that it was given instant recognition and patronage. Mr. Frohman found it especially valuable in the booking of attractions, as the photographs told a full story to a manager in a distant city that was never previously so effective with sketches.

In the early days an 8 x 10 outfit was used, with a lamp burning alcohol, through which the magnesium powder was forced by means of a blow pipe tube, taken in the mouth. The lens was a twelve inch Dallmeyer rectilinear, and Howard plates were used.

In the early days the newspapers and other publications that were using photographs of the stage to supplant the sketches that had been the rule before, were buying the pictures of Mr. Byron. Then there came an awakening on the part of the publishers, who, recognizing the value of their advertising, declined to make any further purchases. They waited for the theatrical managers to start the practice that is now universal, of providing the stage photographs as free offerings. Mr. Byron found his business practically in a state of collapse at

KATHERINE REVNER AS PRINCESS ELIZABETH
IN "PRINCE AND THE PAUPER."
Illustrating article "Photography of the Stage," By Frederic Felix.

this turn, but he met the situation by bringing the managers to a speedier realization of what their best interests were. George Lederer and his partner, of the Casino, were the first to accept the new arrangement and to give their orders direct to Mr. Byron, and to deliver the pictures he produced free to the publications that had previously been paying to have them made.

Mr. Byron has made a wonderfully successful succession of flashlight photographs of the stage set for action, with entire absence of improper shadows, with full modeling of the players' features, and with a general lighting effect far outrivalling any possibilities of daylight. For years past a 11 x 14 camera has been used, with a fourteen-inch Ross-Goerz lens and Wratton panchromatic plates. The pure magnesium is burned in lamps of Mr. Byron's own designing, never put on the market. Bags are never used, but the amount of smoke produced is negligible. In one night, in Milwaukee, he made seventy-six successive photographs with flashlight, a good proof that smoke can be kept down to a decided minimum. One manner of avoiding smoke is the use of powder in small quantity. The great fault, Mr. Byron contends, is in using an excess of powder and ninety-nine per cent of flashlight pictures are faulty because of that reason instead of a lack of powder. One of the secrets of successful illumination is in placing the lights properly and intelligently. In Mr. Byron's plan he uses from three to seven operators with lamps. He has a method of synchronizing their several flashes. The lamps are scattered around the front of the stage and back of the scenery in such manner that every lighting effect that can be wished for is realized.

To avoid the undesirability of having the players show by their eyes that a flashlight photograph is being made, Mr. Byron has followed the plan of making a short, preparatory flash. The lens is then immediately opened, with the larger flashes occurring in the same instant, the result being that the eyes are then caught in a normal condition as being accustomed to what is going on by reason of the small flash.

All the monumental figures of the stage—Jefferson, Bernhardt, Mansfield, Irving and so on—are included in Mr. Byron's negative list, as well as all the present day stars from

their earliest days on the stage down to the time of his retirement from his old-day activity. In arranging for the first flashlight photograph of Mme Bernhardt, she consented only with the understanding that fifteen minutes would be used. When seven or eight exposures had been made she disregarded the unelapsed time and walked off the stage, evidently distrusting the entire innovation as a humbug. But, the next day when several of the newspapers reproduced the pictures that had been made she realized the importance of the new plan and sent for Mr. Byron. She arranged for every costume and every scene of her tour to be taken, and further had all kinds of pictures made as she was moving about naturally in her rooms, with her friends at hand.

An achievement out of the ordinary was recently effected by Mr. Carl W. Atkinson. He was able to get fine pictures of the regular public presentation of "The Trial of Joan of Arc," by Margaret Anglin and company, at the Shubert theater by illumination from the regular theater lighting, and from a place among the regular seats of the house. Several successful pictures were made in this manner. An ordinary camera was used, 6½ x 8½ in size, with 5 x 7 Barnet superspeed orthochromatic plates. The lens was an F/3 Aldis, ten inch focal length, and the exposures were from one to two seconds. Forced tank development, with double strength solution and double time, was used, because the lighting did not have the contrast that it might seem.

New York is filled with photographers who include stage work in their specialties. The product of a dozen of the leading houses is marvellously effective and beautiful, so much so that each studio could easily supply material for a separate additional article.

AMBITION versus EGOTISM

By SIGISMUND BLUMANN

EMULATION leads to greater effort, better work: jealousy creates a desire for more approbation, distinction, prominence. One seeks to do as well or better than a standard, the other merely desires to stand out by any means or method.

And we have the "Climber" in photography as we have him in society. I speak of him who clings to the skirts of the great, flatters, plots, and imitates till he shall have found a foot-hold and is rooted, whereupon he too often wields power and uses it for much evil.

You may know him by the fact that he is always an enthusiastic admirer of present company, but an insiduous knocker of absent co-workers. His praise is a bid for place for himself. It is currency for exchange. He seeks to rise less through his own ability than by your influence. When you cease to be useful you cease to be praiseworthy. He never condemns openly but damns with faint praise. You cannot corner him, for he keeps a hole behind him into which to retreat.

Not a lovable character. Have you such a little fairy in your club? Be sure it is not yourself then Scotch him. When you have helped to make him inocuous the atmosphere shall be sweeter.

In picture making, whether by hand and brush or the camera, egotism hinders great achievement since the consciousness of self detracts from whole-hearted concentration on the mood of the thing. You cannot see the landscape in the mirror if you stick your own face close to it, and focus your eyes on your own image. You cannot produce to please the gods when your fixed purpose is to please certain men who are expected to give you a sort of fame. In a word, you should make pictures, not coin a price for popularity.

Value not Salon honors too highly. What one jury honors another rejects. Nor console yourself with this fact. The

AN ALGERIAN PASTORAL.

Louis J. Steele.

condemnation is probably the better judgment. But study much, learn what you can, strive for excellence and make pictures that depend on no jury, no influence, no formulated novelty (the paradox is purposeful and intentional) for your place. Satisfy your own innermost conscience after you have refined and cultivated that conscience.

Many a man knows within himself that his work is rotten the while he gets highly enraged at someone's telling him it is so. He seeks to fool a cold blooded world who doesn't particularly love him when he cannot fool himself, the object of his greatest affection. Be you not one of these.

When, after slow and arduous climbing you have reached the heights, you will find yourself very little inclined to rail at critics and criticism. Secure in your place you will learn from the mouths of all men and babes and be willing to hear and you will be grateful. For criticism is not so malicious as false praise.

The man who slobbers flattery over me is the man whom I fear. He is most likely to slander me in my absence. The flatterer is ever morally weak, and the courage that fortifies a frank critic is very apt to carry with it rightness.

Shortly after having served on a Salon jury, I wrote an article on Criticism and it came to my ears that this was considered a defense of myself. Dear souls, not a defense at all but consolation to the judged. It did not seek to defend but to solve. As a judge my worth is open to question and debate. Some esteem me highly, some hold me in extreme contempt. Let us take a canvass and find how many love me whom I have felt compelled to keep off the walls, and how many detest me whom my judgment has seen fit to praise.

And how little my opinion matters to the really great! They do not make pictures for me to praise but to enrich an art to which they are devoted. They do not know me. Their excellence and their standing does not depend on my opinion, good or bad. They are not what the opinion of men makes them seem, they are what they are because they are.

Sic semper idem.

THE VIEW CAMERA FOR THE AMATEUR

By JAMES G. TANNAHILL

MANY amateurs, after acquiring experience and knowledge with a Vest Pocket Kodak or a Box Brownie, are desirous of advancing in photography, but are at a loss to know the proper equipment necessary in order to obtain the best results.

The plate camera, with ground glass, naturally suggests itself as the most practical, but since there are many different makes and types on the market at the present time, it may prove difficult for the beginner to make a proper selection.

It is here that the view camera commends itself to the serious and practical worker, and this article is written with the hope that it may prove of assistance to those amateurs who wish to take up photography in its more advanced stages.

Until recently the view camera was considered by many amateurs as belonging strictly to the professional, but during the past few years many advanced workers have adopted the view camera as regular equipment to their outfit, and the results have been surprisingly good.

The chief objection, however, to the view camera is its weight, but this objection may be overcome to a great extent, as will be explained later on in this article.

So far as the writer has been able to discover, the smallest view camera is the 4 x 5 size. This size camera offers practically the same advantages as those of the larger sizes, and is the choice of many owing to its compact size.

The 5 x 7 view camera is used by many amateurs, and one point in its favor is that smaller sized negatives, such as 4 x 5, may be obtained by the use of kits. These kits are small frames, made of very light wood and are placed in the regular plate, or cut film holders, after which the plates are inserted therein and held securely by two small clasps.

The advantage of the 5 x 7 size is that smaller sized negatives may be made with the large size view, but 5 x 7 negatives cannot be had from the 4 x 5 camera. Should cost enter the

THE VEILED LADY. LOUIS J. STEELE.

case, as is likely in experimenting, it is advisable to use the kits with the smaller sized plates.

A few of the principal features to be considered in a good view camera are the vertical and horizontal swing backs; the reversible back; rack and pinion; rising and falling front; lens board and back extension. A brief description of each follows.

The use of the swing back is to keep the plate perpendicular with the object being photographed. Thus, in photographing a very tall building, where it is necessary to tilt the camera in order to obtain the full size image, it will be found that lines of distortion appear and the building will converge at the top. To overcome this difficulty, the swing back is brought into use and by its use, the building will appear as the eye really sees it.

The advantage of the reversible back is apparent when it is realized that to change the position of the camera when either vertical or horizontal views are desired, would involve much trouble; by simply changing the reversible back the desired position may be had.

The rack and pinion device consists of a milled runway over which a milled roller operates, and by racking the bellows back and forth the proper focus may be obtained with slight effort.

The rising and falling front will prove valuable in picturing buildings or landscapes where objectionable foreground may appear. By raising the front less foreground will appear in the picture.

The convenience of the lens board is much appreciated by workers who have use for different lenses. While some of the ordinary plate cameras have removable lens boards, not all are equipped with this convenience. By its use, different lenses may be used by simply screwing the lens into the flange which is screwed to the board itself.

Special attention is called to the back extension of the modern view camera.

Its use is indispensable in using the convertible features of lenses. Where wide angle lenses are employed the bellows can be racked back and the front extension closed, thereby obtaining a wider view. By the use of the convertible features of the lenses, different sized objects may be obtained. This point is illustrated in a later paragraph.

MOSKORINA. PREMIER BALLET. P. J. SCHWEICHART.

While the main point of this article is to call attention of the many advantages of the view camera over the ordinary

Figure 1.

plate camera, it may prove of assistance to many amateurs to consider in brief the subject of lenses adapted for use with the view camera.

Figure 2.

The two types of lenses most commonly used with the view camera are the rapid rectilinear and the anastigmat. Portrait,

wide angle, long and short focus and diffused lens may be classed as above.

While the rapid rectilinear lens has its field and will in many cases give very good results, the use of the anastigmat is advised. Since many workers prefer the anastigmat, this article will deal only with that type of lens. For all around work, field, commercial, portrait, copying, enlarging, reducing the anastigmat lens will give very good results.

Figure 3.

The bellows extension is still another feature which should be given serious consideration. In the ordinary plate cameras 12 to 15 inches is about the general run, but in view cameras a draw of about 20 inches in the 4 x 5 size, and from 22 to 26 inches in the 5 x 7 size is advised. This is an essential point and should not be overlooked, for in using the single elements of the convertible lens it will prove indispensable. Triple extension rather than double extension of the bellows should be a point in selecting the view camera.

To those unacquainted with the different types of lenses a brief description is here offered.

Anastigmat lenses can be divided into three classes and,

the selection is therefore left to the reader, as to which lens may best be suited to the particular needs of the individual.

The true convertible lens is formed of two fully corrected combinations of unequal focal length, and each may be used alone.

The symmetrical lens is composed of lenses having equal focal lengths and are also corrected for use as single lenses. However, using the single lens alone will double the size of the image, whereas in the true convertible lens, three different sizes may be obtained.

The third and last type of the anastigmat is that lens which can be used only for the plate for which it is listed, and its use for the view camera is not recommended by the writer.

After many different cameras had been tried by the writer, the one selected was the 5 x 7 View with convertible anastigmat lens working at F6/8, and having a focal length of 8½ inches. This is a true convertible, the rear lens working at F12/5, and having a focal length of 14 inches, while the front element working at F/16 has a focal length of 20 inches. This outfit the writer has used for many years, and is one which will do whatever called upon.

The use of the back extension, reference to which was made in a previous paragraph will here be illustrated in conjunction with the use of the different focal length of the lenses.

In Figure 1, the doublet or complete lens was used. The camera was approximately one third of a mile away from the object being photographed.

By removing the front lens and using the rear element alone, the picture as shown in Figure 2 was obtained, while in the case of Figure 3, the front lens was replaced, and the rear lens removed. As will readily be seen three different sized pictures were obtained, and all were made with the true convertible lens.

This same effect, however, could have been obtained by using what is known as a telephoto lens or attachment, but as this type of lens can be used for magnifying or enlarging only, its use is not advised for the amateur whose pocketbook may not stand such a strain.

In a previous paragraph reference was made to the weight of the view camera as being the chief objection. While this

THE TAMBOURINE DANCE. **Herbert Irons.**

objection, to a certain extent may be sustained, the writer believes it may be overcome to some degree.

It is admitted that to take a "hike" in the country with the regular outfit of the view would entail considerable trouble, but the writer is using the view camera very much for outside work and has adopted an outfit which has proven very satisfactory.

A French knapsack, such as was used in the late war, is what is used by the writer. It is made of strong canvas on the upper part, while the lower half is made of leather. Several compartments will adapt themselves to taking as many as eight plate or film holders, back extension, tripod and top. The tripod, however, may be carried in the hand, or left in the knapsack, protruding slightly beyond the edge of the bag. With the introduction of cut films, however, much weight has been eliminated.

The knapsack can be slung over the shoulder and carried conveniently on the back or side. With this style equipment, the writer has "hiked" many miles in the open country and it may be said, without fatigue. The results from a trip such as this have been negatives impossible to obtain with the ordinary type of plate camera, a sound body and a healthy appetite.

The use of a view camera with a good lens is recommended to those who are serious for better pictures, and its use cannot be too strongly urged.

To those amateurs wanting to learn more, the writer would add that the camera clubs offer ideal inducements, and with proper concentration on the work, it will be but a short time before the amateur will have mastered photography in its advanced stages.

SEPIAS WITH CERTAINTY

By AUGUST KRUG

NO claim is made that all of the methods I am about to advocate are either new or original: they are simply so little known that some space in the *Annual* may with profit be devoted to them.

The prime requirement in securing good sepia tones on either bromide or developing-out papers is full development of the black-and-white print. Every particle of the silver halide which has been acted on by light must be reduced to the metallic form. An acceptable sepia color will always result if the original print has been correctly exposed and developed as far as it will go, even to the point of inducing a trifle of chemical fog.

The hypo-alum process will yield sepias of excellent tone, with a fair degree of uniformity. The reaction, however, is somewhat involved, and the results, in my hands at least, are not altogether permanent. It may not be quite fair to blame the mottled sepias in my possession on this process, since other causes may have induced their fading: nevertheless, he who pins his faith to the bleach-and-redevelopment method of obtaining sepia tones will not have cause to complain of fugitive prints. If he should happen to fail, he knows it at once.

The procedure is well-known, of course. The black-and-white print is bleached to convert the silver image to one of the halide salts, which is then in turn changed to silver sulphide, normally a dark-brown, stable compound. Proportions differ: a good formula for the customary ferricyanide-bromide bleach follows:

Water	30 oz.
Potassium ferricyanide	1 oz.
Potassium bromide	1 oz.
Denatured alcohol	2 oz.

In using this bleach it is imperative that the prints be free from all traces of hypo, if details in the high lights are wanted. Otherwise the hypo in the print will combine with

SEA URCHINS. G. H. S. HARDING.

the ferricyanide in the bleach to form Farmer's Reducer, which will slightly reduce the print all over, but mainly in the lights, where, too, it will be most apparent. The ferricyanide bleach is also productive of blue spots, caused by iron in the paper, or in the water used for making up solutions, washing, etc. The reaction between the iron and the ferricyanide forms prussian blue. In severe cases the blue coloration extends over the whole print.

It is ordinarily advised to touch the spots with strong hydrochloric acid to get rid of them: if this fails, a weak solution of sodium bicarbonate (baking soda) will sometimes loosen them up. To prevent the blue spots avoid using chipped or cracked enameled trays which have the iron base exposed. Filter the water you are using through several plies of cheese-cloth or muslin. Better still, try one of the other bleachers now available. Any bleacher advocated for bromoil work is good. Some recommend the permanganate bleach highly. Or try the following:

Water	32 oz.
Copper sulphate	1/4 oz.
Sodium chloride (common salt)	1/2 oz.

Do not bleach or wash the prints by strong daylight. Wash thoroughly to free the prints from bleacher: it is not necessary to dry after bleaching.

It is customarily recommended that either the sodium or barium salt be used to sulphide the bleached image. They are both open to objection, the sodium sulphide being unstable and likely to contain impurities, the barium sulphide being difficult to dissolve and giving tones tending to yellow.

Altogether, the best redeveloper available is ammonium sulphide solution, obtainable at any large chemical supply house in pound bottles. This is a clear yellow liquid, quite stable, easy to use, and most efficient. A single sniff at an uncorked bottle of it will serve to convince the most skeptical of its efficiency.

For use, a few drops of the solution are added to a pint of water, and well stirred, when a milky emulsion will be formed. The exact proportions are immaterial: unless you own and use a gas-mask, you will do well to add no more of the ammonium sulphide solution than is actually required to do the work. This solution exercises a softening action on

FIGURE STUDY. JOHN HOWARD PAINE.

the gelatine film as do all sulphiding baths. With certain bromide papers this results in severe blistering, which is undesirable at the least and extremely irritating at most. A hardener, such as alum or formaldehyde, is stirred into the sulphiding bath to enable the gelatine to overcome the blistering tendency. Its use is recommended anyway. A good formula, then, for the sulphiding bath would be about as follows, although as before stated the proportions need not be strictly adhered to:

Water	32 oz.
White (or potash) alum	1 oz.
Ammonium sulphide solution	60 min.

A clean, unchipped enamel tray is best for the sulphiding process. The action begins immediately, but the prints should be left in the solution until the image has had time to become completely converted. If all the operations are properly carried out, the prints will assume a rich brown color, free from any tinge of yellow or purple. They should be washed thoroughly, dried in the usual manner, and mounted either wet or dry at the option of the photographer if the hardener is used in the redeveloper.

The making of sepia prints by this method will never become a very popular indoor sport, since the suspicion of his having been in close communion with an egg of the throwing variety will have the net result of bringing the photographer in bad odor with other and probably more influential members of his family. If, however, we inconvenience ourselves and others, olfactorily speaking, we should see to it that we are reimbursed to a certain extent by the acquisition of sepia prints which are beautiful in color and unquestionably permanent.

SPRING. TAIZO KATO.

PHOTOGRAPHY IN MEDICAL WORK

By MILES J. BREUER, M.A., M.D., F.A.C.P.

THE camera has played a very important part in the advance and dissemination of medical knowledge. We are, however, accustomed to considering that its usefulness is limited to research and the big institution, and quite out of the sphere of the average practitioner. Yet, it is in the hands of the latter that photography can find one of its greatest opportunities for usefulness. The physician whose daily task lies among the masses of ordinary folks, and who is not backed by an elaborately equipped institution, can increase his own efficiency, his contribution to the progress of his science, and his satisfaction in his work, by the intelligent use of the camera.

I am indicating below some of the main uses to which a camera may be put, in the work of a general practitioner, but my discussion is by no means exhaustive. It only hits the high spots, and the man who becomes at all interested, will find that he can branch out from these main lines and make the camera help him in many other ways.

RECORDS

By the kind of records a doctor keeps, you can tell how good a doctor he is. The efficiency of his services to his patients, and his value to his profession, depend directly and primarily on his records. The day is past when a medical man can depend on his head to hold all he needs. And to-day, what records is it possible to keep, without photography? Only financial ones. In all other kinds of records, photography fills a place which cannot be filled by any other method.

(*a*). *Routine Records.*

Often the picture of a lesion, deformity, or other condition, can be made so much more quickly, and will describe and record the condition so much more clearly and accurately than a verbal description, that the latter is a waste of time and effort. Again, there are conditions that can scarcely be de-

IRVING S. LOVEGROVE.

scribed in words at all, while a picture, made in a moment, will give all the desired information. Pictures also yield up their information more quickly, when the records are later referred to; accurate descriptions of unfamiliar or abstract things make difficult reading. In Figure 1, which was made to illustrate a discussion on thoracic disease, the appearance about the neck and shoulders, the various muscle spasms and atonies, are very difficult to convey in words in such a way that the hearer will recognize the same things when he sees them in another patient. From a picture, he can recognize the condition at once, the next time he sees it.

(*b*). *Protection of the Physician's Interests.*

It is astonishing how people forget how serious their trouble

Figure 1.
Physical Signs of Thoracic Lesions.

was, after they have gotten well, and the time has come to pay the bill. Patients will criticize a surgical result because they have forgotten what they had to start with. In the case of the patient shown in Figure 2, the leg was straightened perfectly, but remained about three inches short; the picture reminds us that we did pretty well, considering. A glimpse of a picture of the original condition, and a comparison with the result after treatment, will remind folks what the doctor has done for them, and increase their gratitude, both sentimental and material.

(*c*). *Medicolegal.*

No matter how well qualified a doctor is, or thinks he is,

he must always consider the possibility of malpractice suits. Sometimes they drop out of a clear sky. If, in such a case he can show a picture of the condition as it existed when the patient came to him, he stands a much better chance with a judge and jury. If in addition he can prove that it is his

Figure 2.
A Difficult Problem for the Surgeon.

custom to make such pictures as a routine, his chances are still further increased.

(*d*). *Curiosities.*

All of us like to keep a collection of the rare and curious things that come up in our work. This is especially interesting in medical work, apart from its scientific value. However, many of the rarities and curiosities that the doctor sees, are incapable of preservation; and many others are of such nature that it is impossible to have very many of them around, unless

you own a hall; they are too bulky, and are not pleasant company for non-medical folks. Without your camera they are lost to you. But pictures will record them accurately, and preserve them in small space. In Figures 3 and 4, I have shown two of my interesting relics.

SCIENTIFIC WORK

Every medical man, no matter how commonplace his work or how humble his station, must occasionally have clinical material in his practice and thoughts in his head, that are of value

Figure 3.
Museum Specimen. Extraordinary Appendix.

to other medical men. He is not modern nor progressive, nor fulfilling his widest duty, unless he occasionally publishes something in a medical journal. The value and interest of such articles is enormously enhanced by suitable illustrations. The reader always turns more readily to an article that is illustrated, and the chances are he accepts its arguments and remembers them, much better.

Likewise, every progressive medical man presents a paper before some professional society, occasionally if not oftener. The general run of these papers have a tendency to be pretty dry listening. It is quite remarkable how an audience will prick up its attention when a few good lantern-slides are put

THE LONELY GRAVE

DR. J. B. PARDOE.

on the screen to illustrate a paper that is being read. It used to be the custom, when presenting such papers, to hang up great paper charts with figures painted on them. How much more effective and less cumbersome is it, to make up the material photographically into lantern-slides and project them on a screen before your audience!

The up-to-date professional man to-day recognizes that it is his duty to report to the profession in its technical literature,

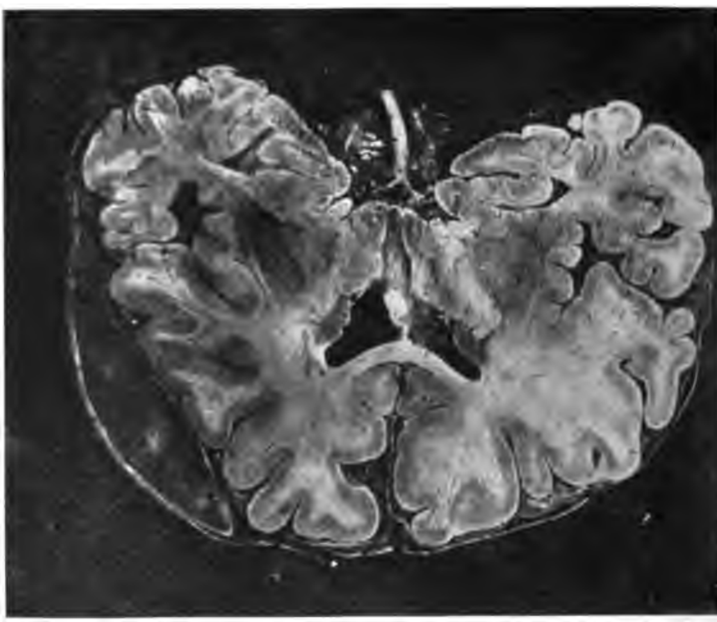


Figure 4.
Blood-clot Pressing on the Brain.

any of his observations or devices that may be of value to others. In reporting his cases and his methods, there will be numerous matters that can be expressed only imperfectly and with much encumbrance in words, while a picture flashes the idea across at once. Visible physical signs, physical lesions and deformities, peculiar apparatus or instruments, and the technic of their use, are often far better expressed in the universal language of pictures, than by verbal description. My little apparatus in Figures 5 and 6 seems much more real

A CHAT IN THE PARK AT NIGHT. LOUIS F. BUCHER.

to the pathological reader interested in new methods, from the photograph, than they would from any kind of description.

HANDLING PATIENTS

In giving directions to patients and nurses for carrying out various procedures, pictures are indispensable. Very often a doctor's treatment fails because the patient has not grasped the idea, which to the doctor seems so easy and clear. For

Figure 5.
An Original Piece of Apparatus, and How to Use It

instance, I have a set of exercises that I prescribe for certain cases. I hand the patient a print (Figure 7) showing how these are to be done; and two hours explanation would not convey the idea to her as well. Besides, I have found it a considerable stimulus and encouragement to a patient to have before her eyes the picture of a well-formed model assuming the correct positions easily and gracefully; it urges her toward an ideal in a way that the physician's talk could never accomplish.

Again, I have pictures of the way in which babies should be handled and dressed, and the kinds of milk-bottles that

THE COMING OF SPRING. LOUIS A. DYAR.

should be used and should not be used; these I have filed in a card-index drawer in my desk, so that I can put my hand on them instantly, when I need them in talking to a patient.

I have given a brief sketch of the way in which photography can be useful to the general practitioner. My friend, the G.P., will read this and say: "That is all very well, but it takes either so much trouble, or so much expense, to get these pictures, that the advantages are not worth it." He will say this because of his misconception of the amount of trouble it takes. It actually takes very little. The main obstacle is in the mental attitude, and the greatest trouble is in getting your mind ready and willing to do it. The actual work amounts to very little. Let me tell you how I have been doing it; and I am as busy as the next one.

At present, I use a 4 x 5 Graflex, but I have made many quite creditable pictures with a small pocket film camera. A good lens is a *sine qua non*. Mine is an F/4.5 anastigmat. Many clinical photographers use a 5 x 7; but I feel that a 4 x 5 print will show everything as well as the larger print will show it, and if desirable, it can be enlarged to any size. The 4 x 5 has the advantage of being less cumbersome, less expensive, and admits of work at shorter focal length. My Graflex is a revolving-back auto, with a very long bellows extension, to permit of taking objects their natural size. I usually use it on a tripod.

The camera is always ready in the office. This is the secret of the whole business. In a hospital, one has sufficient control over patients and conditions, so that a picture may be planned. Not all of the interesting and valuable cases come to a hospital; in fact, the class of cases that comes to the private practitioner is so little described and reported that the need is at present far greater in the latter field. And private patients do not like to run around to a photographer, or even come back to the office to be photographed. You have to take advantage of the "psychological moment," and usually you have to manufacture the "psychological moment" itself; and then grab the picture while the grabbing is good. Then you reach for your camera and expose, and the record is yours forever. (Caution: Do not expose peoples faces in published pictures without their permission. Lawsuits might result.)

YOSEMITE FALLS, CALIFORNIA. CARL KATTELMANN.

My illumination is a flashlight as a rule, with an Imp flashlight gun. By using the flashlight method, it is possible to standardize the conditions and work mechanically, thereby assuring a maximum percentage of good results. A fine-grained plate of moderately rapid emulsion, such as a Seed 26 is best for ordinary work; but many subjects will come up in which non-halation, orthochromatic, and panchromatic plates, with proper filters will be necessary.

Again, the average doctor will say: "It requires more skill than I've got, to get pictures that are any good." It is true that it requires some skill to get these pictures, but that skill

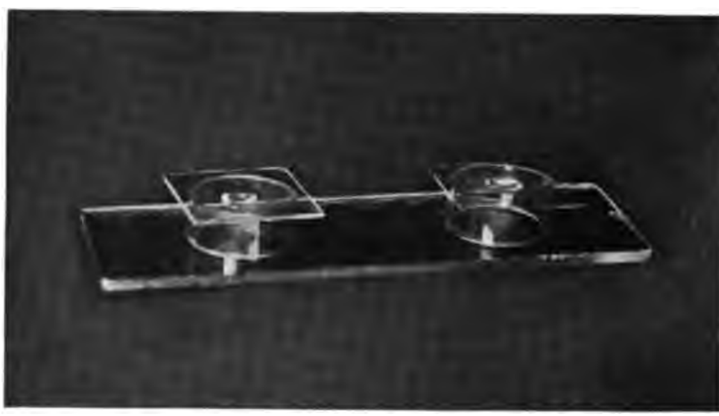


Figure 6.
An Original Device for the Laboratory. The Picture Explains It Better Than Words.

can readily be acquired. It is far simpler than many of the other things that a doctor is constantly called upon to learn and apply. The necessary skill can practically be said to consist in two things and no more: proper lighting and proper exposure. The proper exposure is not difficult. With a flashlight one can determine by a few trials, once for all, the proper conditions.

The trick of lighting is a little more difficult, because there can be no rule. Each picture has its own requirements, and each subject must be lighted in such a way as to bring out the particular points which constitute its reason for being photographed. Herein lies one of the main reasons for a doctor doing his own photography, unless he is so situated

that he can command the services of a technician who is thoroughly in sympathy with medical subjects. The average commercial photographer sees something totally different in your subjects than you do, and your picture as he makes it, often turns out quite disappointing. In Figure 1, A, in order to bring out the two remarkable depressions in the upper chest on each side of the sternum, that light had to come almost directly from the side. The correct position was found by watching the ground-glass, while an assistant manipulated a 100-watt Mazda electric lamp; and the flashlight was then

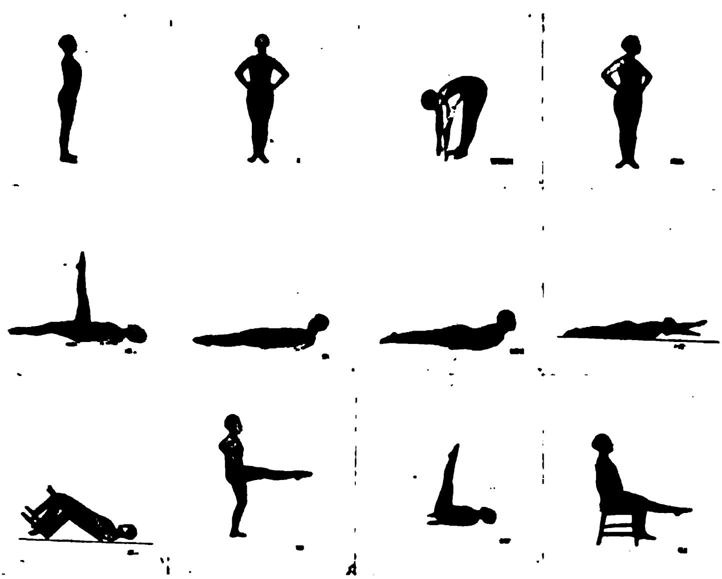


Figure 7.
Exercises. Directions for the Patient.

held in that position. In Figure 1, B, I wanted to show how the muscles on the left side of the neck stood out, and the usual 45° lighting seemed to give the best results; yet in Figure 1 C, an almost identical pathological condition, on the opposite side of the neck gave much the best result with the light very nearly straight in front, and very low.

The "finishing" of the pictures is a secondary matter. The doctor who loves photography for its own sake, will find it no problem. To him I would suggest that the time-and-

temperature system of tank development is the only scientific and accurate method. The doctor who has a laboratory technician, can readily teach her to do his finishing; that is far easier than the blood-counts and Wassermann tests which she is supposed to be able to do properly. Or, the picture can be taken to a photographer to be developed and printed. Only, in this respect, let me speak a word of caution. Do not take them to the average "kodak finisher." That man, in most cases, lacks skill and insight; he is after popular effects with white borders and much contrast, and he will murder your detail and massacre your gradations. Take them to a good commercial photographer. I enjoy developing my own plates, but usually leave the printing to a commercial photographer.

Here are some of the subjects that will come up in this sort of work, and a few hints as to how they should be handled.

PATHOLOGICAL LESIONS

Physical deformities involving mainly shape considerations. can be handled on an ordinary plate. But open wounds, skin eruptions, and discolored conditions may or may not require orthochromatic plates with filters. Whether or not you require color-sensitive plates and filters depends, not on the color of your subject, but on what your picture is supposed to show. If you want to bring out a red eruption on a white skin, you will get a better result on a color-blind plate without a screen; the lesions show up dark against a white ground. On the other hand, if you have a wound or an operation, and your tissues are red and yellow, you cannot bring out detail unless you have a panchromatic plate and a K-3 filter. It is not true color values that we are after at all; it is after distinctions that will bring out particular points.

PATHOLOGICAL SPECIMENS

When fresh specimens are being photographed, the above remarks concerning plates and filters apply. Preserved specimens have lost their color, and can be handled on ordinary plates. As a rule, unless there is some feature about the fresh specimen which is lost by preservation methods, it is best to defer the photography until the preserving fluid has hardened and whitened the specimen.

There is a simple little dodge which will improve pictures

DRAGGING FOR SMALL BAIT.   R. B. M. TAYLOR.

of pathological specimens to such a wonderful extent, that no one should omit it. Photograph the specimens under water. This does away with distracting spots of reflection from wet surfaces, with drops of fluid adhering to the specimen; it preserves the shape of the specimen and the proper appearance of small tags and threads, and little loose portions of tissue. The latter will droop flabbily in the air, while under water they will float out to a very natural position. Figures 3 and 4 illustrate this; photographed in the air, they would have appeared flabby, wrinkled, misshapen, and shrunken. Rendering of detail and texture is also much improved. (I am indebted for this idea to Dr. Wilson of the Mayo Clinic). The surface of the water must be kept free from scum or bits of floating tissue. The dish must be absolutely stationary, to avoid currents in the water, which would cause movement in parts of the subject. The camera and light must be so placed as to avoid reflections from the surface of the water. There is no particular practical difficulty in any of these points. The work is best done in a glass vessel with a black bottom; opaque screens can then be placed wherever needed to control the lighting.

APPARATUS AND INSTRUMENTS

Non-halation plates are necessary wherever glass or nickel-plated objects are included in the subject. Be careful of the background (and this applies to all classes of subject); it should be either black or white to contrast properly with the subject, and perfectly plain. It should not be wall-paper nor the side of a house, nor some piece of furniture that is not part of the discussion. I use an old focusing-cloth and a sheet of white muslin, which I keep rolled on a pole when not in use. When gray backgrounds are necessary, sheets of mounting paper are the most convenient.

TECHNIC OF MEDICAL METHODS AND PROCEDURES

How to handle a certain instrument, how to apply a certain dressing, can often be told better in a picture than in words. Such a picture must be posed, yet it must not look posed. It is seldom, if ever, possible to walk up to someone performing the act, say a nurse giving a treatment or an assistant making a test, and take a snapshot of it and expect a good picture. The group and setting must be arranged for the

BELLE JOHNSON.

occasion, and the objects and persons posed to bring out the idea. However, the people in the picture should endeavor to look as though it were real business; and the only way to achieve that is to forget that a picture is being made, and feel that they are actually at work.

COPIES

The man who writes articles or lectures, will frequently want diagrams and charts photographed. Especially for purposes of lantern-slide presentation, he will frequently require copies from books, typewritten tables, sketches, cards, etc. Copying is a subject that is abundantly treated elsewhere in photographic literature, and I shall dismiss it here with the statement that process plates and artificial light, with careful records of exposures, will enable you to standardize your conditions, and get good results every time. A flat-field lens, like an anastigmat, will save much time and trouble. Special contrast developers are advisable.

PHOTOMICROGRAPHY

This is one of the most fascinating fields into which photography will lead the doctor. Its technic is also a subject by itself, and is adequately handled in numerous books and articles in photographic literature as well as in medical literature. (The Eastman Kodak Company's complimentary booklet on the subject is excellent.) In medical work, photomicrographs are usually of blue or purple nuclei on a red or pink ground. Therefore, a panchromatic plate and a yellow filter are necessary to bring them out. When specially-stained sections are being used, filters must be varied to produce a result that will give the same idea as looking at the section. Thus, in photographing a Ziehl-Nielssen stain of tubercle bacilli, it would be advisable to have the red-stained bacilli stand out black against the blue background; for this a blue screen or green screen would be required. Even when non-stained subjects, such as urinary sediments are being photographed, an orthochromatic plate with a yellow filter should be used, because microscopic objectives are not corrected for color. Their image, as we focus it with our eye is mostly of yellow rays, and does not coincide accurately with the upper-spectrum image to which the ordinary plate is most sensitive.

REFLECTIONS. ROBERT R. MC GEORGE.

STEREOSCOPIC WORK

This is not very commonly used by clinicians, though pathologists employ it more frequently. The power of stereoscopy in bringing out shapes and space relations, however, is a very valuable thing when we are trying to depict some complicated apparatus, or operation, or some specimen difficult of description. For this class of work, it must be kept in mind that when small objects are being photographed at close range, the ordinary stereoscopic camera will exaggerate the perspective and give a distorted appearance. The ordinary separation of the lenses is too great for natural effect, and lenses closer together must be used. In the hands of the average physician, the expense of a special camera for this purpose, with adjustable lens-separation, is not warranted. I have arranged a stand for this purpose, which enables me to accomplish the same result with one lens, by swinging the camera through an angle, the size of which depends on the focal distance. It is swung on a board which acts as a radius of the angle, its center being at the object photographed. An article of this length does not permit of further details of the construction of the apparatus, or of the angle to be used.

The usefulness of photography to the doctor will be considerably augmented by a proper method for filing prints and negatives. Hundreds or thousands will soon accumulate; many of them will not have their usefulness exhausted on the first occasion of their use. If we want them again, it must be possible to lay hands on them at a moment's notice. My print file is an album, which is likewise a very interesting little museum of technical and pathological studies. For methods of filing negatives, see one or more of the numerous articles on the subject in photographic books and journals; I am only urging that some system be adopted and adhered to.

NOT SO "PACIFIC" THIS EVENING. W. C. SAWYER.

PICTURES THAT TELL A STORY

By GEORGE W. FRENCH

ONE of the first signs that an amateur photographer is passing out of the snap-shot stage into the broader field of the few who really try to make interesting pictures, i.e., pictures that are interesting to other people than themselves, is the production of prints in which the human figures depicted are apparently unaware of the presence of a camera. Such pictures are unlimited in their variety, nor do they call for long walks in search of fitting subjects. Wherever one or more people can be found, there is the material for a great variety of exposures. A camera, tripod, plates, knowledge of composition, and common sense will do the rest.

Pictures that tell stories, scientifically known as Genres, make pleasant many hours of our lives that would otherwise be devoid of interest. Electric cars are now picture galleries of story-telling pictures. Advertisers cannot properly present their goods without them, and thus we could proceed mentioning many phases of human activity in which these kind of pictures play an important part.

Now, to get down to the fundamentals of genre work. We all delight in such pictures as important plays in a football game, the finish of a race, etc., all of which require a fast lens and a quick eye, but many of the world's most popular works of art are pictures that represent phases in the daily work of man, or the tireless play of children. Take for instance Millet's "The Angelus," and Raeburn's "Boy with Rabbit." Such pictures as these, if posed for the camera, would not require a speedy lens. So, no one who loves to take pictures should let the lack of one of the fastest lenses deter him from going into this interesting branch of photography with the intention of producing pictures that will demand the attention and even praise of his friends.

In preparing for genre work we should first learn the principles of composition. By so doing we shall avoid such common blunders as the following:

1. Having two figures some distance apart with the same

KELLY'S ALLEY. ARTHUR D. CHAPMAN.

intensity of lighting. Caution 1. The principal figure should be most strongly illuminated, or should wear the lightest clothes. All others should be subdued in tone.

2. Representing a figure as walking out of the picture. Caution 2. Always have more space in front of the principal figure than behind it.

3. Having the figures so small that, according to art principles the picture comes under "landscapes with figures" rather than genres. Caution 3. The principal figure in a genre should occupy a space at least equal to one-quarter of the diagonal of the picture.

4. Having a lack of harmony between the figures and the surroundings. Caution 4. Ordinarily the figures should be dressed in accordance with the requirements of the work which they are performing. For example, a ploughing scene should contain a typical farmer, not a person with high collar and starched shirt. The theme should coincide with the setting. Common sense should be a sufficient guide in this respect.

5. Having the picture all out of balance. Caution 5. Let the principles of the old fashioned steelyard govern the arrangement. The more important object should occupy the larger space. The secondary object the smaller, and so placed as to balance the larger. Other principles to observe are as follows:

Figures should be so placed as to represent the qualities that you are aiming to illustrate. For instance if vigorous action is the motive, study to place the figure or figures in a position which will make it evident that force is being used. Positions that produce slanting or curved lines will best serve this purpose. Slanting lines are always stronger than horizontal or vertical lines if action is being depicted.

The principal object should never be placed in the center of the picture space, for this is the weakest point.

Figures should be connected in some way by strong lines, unless in juxtaposition. It is an old rule in two-figure genres that two profiles, two three-quarter, or two full face figures rarely look well. Variety is needed, therefore a profile and a three-quarter face look better, or a three-quarter and a full face. Even a differentiation of tone in the ground-work between two figures will serve as a connecting line.

AN OHIO ROAD. Lawrence Baker.

If three figures appear in the composition two of them should be in juxtaposition, or else their heads should be in an irregular line. Figures must form unity.

Care should be observed in selecting the background. Ordinarily there should not be extreme contrast between figures and the background, nor should the background contain anything that will attract the attention from the figures. No object should be allowed to coincide with the heads of figures in such a way as to produce what appears to be monstrosities such as tree trunks protruding from the top of the head, etc.

All objects of any count should be so arranged that they form of themselves, or with the principal object, an irregular line such as a slant or a curve.

Human figures should not be so placed that their heads are in the same horizontal plane.

In posing figures to get the best expression suggest that they proceed with the work until you give a signal to hold, then make the exposure. Always try to take such pictures at the critical moment when the actors, conscious or unconscious, seem most interested in the work which they are doing.

Genres of children are harder to secure except with the faster type of lens, but after much practice, very pleasing results can be obtained by being patient and alert.

Much more could be written about this important branch of photography, but the points most essential to correct genre work in respect to composition and story telling qualities have been covered.

SHAKER PARK.
Illustrating article "Stereoscopic Photography," by C. H. Shipman.

STEREOSCOPIC PHOTOGRAPHY

By C. H. SHIPMAN

DO you remember the happy, interested hours we spent, when visiting our grandparents, viewing the "World Before Our Eyes" through the stereoscope? No pictures since have been able to produce the lasting impression made by those views, or give us as accurate an idea of the objects pictured.

With the advent of the "Photography made easy" methods, interest in the stereo waned, and those old scopes and views were relegated to the attic. Within the last few years interest in the stereo view has been revived, and it is time for us to bring the old stereoscope and views from their hiding place, dust them off, and add them to our collection of photos.

Our renewed interest will make us wish we might have views of our friends and favorite scenes. Nothing more simple. Let us go to the dealer and procure a stereo camera.

We have a considerable choice, 45 by 107 m.m., 6 by 13 or 7 by 13 c.m., or 10 by 15 c.m. with high speed lenses and fast shutters, or 45 by 107 m.m. with single lenses and a sliding shutter, at prices from $15 to $500. Or we may procure a

ELLIOTT STUDIO.

Stereo Kodak or Graflex, or one of several models of 5 by 7 hand cameras which are adapted for both stereo and full size pictures. Most of these cameras use plates, or cut film, or film packs. A few use roll film, but lack the advantage of the ground glass.

Since the scopes that we have rescued from the attic are standard size, let us obtain one of the 5 by 7 hand cameras with stereo lenses and removable division. The half of a stereo print is 3¼ in. high by 2⅞ wide, therefore it will be well to rule the ground-glass as an aid to composition of the views.

Now, we load holders or pack adopter and away to one of our favorite haunts. We choose a view including both near and distant objects, level the camera sidewise, focus on a point about 25 feet away, stop down until everything is sharp and give a full exposure. After taking two or three more views, we return to the darkroom to develop. This process needs care as any defect in the negative stands out upon the print in most unpleasant manner. It is very difficult to spot a stereo negative so that it will not show in the print. We must use a soft working developer as much contrast is fatal to good results.

When our negatives are dry, comes the question of printing. As a rule it is best to use a glossy paper, which may be die cut if we have a self transposing printing frame, since the prints must be transposed. Lacking this frame we may print direct and afterwards trim and transpose the prints when mounting. In this case with pencil draw a long oval on the back of the prints, or otherwise mark them, so that they may be identified and paired and transposed properly. Each print should be trimmed to 2⅞ in. wide and 3¼ in. high so that the print to be mounted on the right will be trimmed about 1/16 in. more to the left than the other. Trim the bottom edge first, being careful to cut parallel to the like objects in the two views. Then cut the views apart and finish trimming. Mount the prints close together on a stereo mount which is 3½ by 7 inches. Use both sides to save space and expense.

If film negatives are made, a good way is to cut a mask 5 by 7 inches outside with two openings 3¼ in. high and 2⅞ in. wide with a ⅛ in. strip between. Cut the films apart and mount the left one on the right opening, having the glossy side of the film up. Fasten with bits of lantern slide tape.

THROUGH FOG AND MIST. P. F. SQUIER.

Put the mask on a 5 by 7 glass, place in the stereoscope, and slip the other half film about until the result is correct, then fasten it down too. Now print direct on a 5 by 7 inch sheet of double weight paper and trim to 3½ by 7 inches. Dry mount two such prints together back to back.

If dark borders are preferred, double printing must be employed. Cut the openings in the mask about 3⅛ in. wide and 3½ in. high; cut two forms 2⅞ by 3¼ in. and mount on glass or a clear film so as to protect the pictures when printing the border. Be sure both negative and border masks register into same corner of the printing frame. After printing the picture, print the border long enough to secure a good black.

The above instructions apply to any size stereo with proper changes to allow for size of view and separation of lenses, both taking and viewing. For the small sizes, transparencies are better than prints, but necessitate the use of a transposing printing frame, or purchase of a stereoscope with reversing prisms.

The stereo is now widely used by physicians, medical colleges, public schools and the commercial world. The stereo view shows three dimensions and gives the illusion of correct size, and is valuable in any line of endeavor requiring these features.

WADE PARK POND AND THE MUSEUM OF ART, CLEVELAND, O.
Illustrating article "Stereoscopic Photography," by C. H. Shipman.

IRVING S. LOVEGROVE.

KNOW THE LIGHT

By RALPH S. HAWKINS

I BELIEVE that the greatest number of photographic failures are directly traceable to errors in the exposure of the sensitive plate or film. If photographers would come to a realization of what an important relation exposure bears to the securing of desired results and effects, it would advance the progress of photography more than any other one thing. This may seem a very broad statement to make, but I think that the countless number of failures that can be definitely traced to this cause will bear out my contention.

Correct exposure is a relative term—within certain reasonable limits—and is more or less directly dependent upon the subsequent treatment of the positive, and the results or effects that it is desired to produce. But we must go farther than just correct exposure—we must acquire the habit and the knowledge to work understandingly. We must be thorough technicians, and we must know the possibilities and the limits of our medium. We should aim to produce the results and effects we desire, rather than accept the results that we obtain through aimless efforts. I have seen an under-exposed film, made by the veriest tyro, enlarged by a skillful worker through a soft focus lens and handled in a low key, that resulted in a very pleasing moonlight effect. And I have seen this same procedure followed by so-called serious workers—men regarded as pictorial photographers—but I decry the practice. It is aimless work, and does not develop the highest conception of artistic expression, or photographic technique. We would not long tolerate a building contractor to proclaim himself as such, who would take the plans and specifications for a seven room bungalow and construct a building that resembled a public garage. His explanation that he had made a few errors here, and a few mistakes there, but that the resulting building could be used for other purposes, would have little weight in establishing him a successful contractor. Yet we continue to encourage photographers to just such inane and idiotic things.

WILLIAM SAUTER AS IAGO. **Oscar Maurer.**

There is no process in photography that is entirely mechanical—that is apart from, or lacks, the personal element, and it behooves us to know and to apply our knowledge understandingly to each successive step in the making of a picture. The first problem that confronts us for solution is the correct exposure of the sensitive plate or film.

Photography is the recording of light intensities, and when we make a photograph, we record the light intensities that are reflected from the subject through the lens, and onto the sensitive surface of the plate or film. We know that the light varies in intensity throughout the seasons of the year and the hours of the day, being brightest in the months of May, June and July, and between the hours of ten in the morning and two in the afternoon. We know that plates and films vary in sensitiveness according to the brand and make, but that each brand may be relied upon to be practically uniform in sensitiveness, and that a little experimenting will enable us to know what that sensitiveness is for all practical purposes.

We have then, three principal factors to consider in determining the necessary exposure required for making a picture. They are: First—The intensity of the light. Second—The amount and intensity of the light that the subject reflects. Third—The "speed" or sensitiveness of the plate or film. The first of these factors is of a variable nature, and must be calculated for each separate exposure. The second factor is largely dependent upon the first, and constitutes the personal element in the equation. It must also be considered for each individual exposure. The third factor is the only one that we can safely consider as a known quantity.

Let us consider for a moment the procedure of the average photographer in determining the necessary exposure to give his plate. The subject is selected, the view point established and the camera set up. The picture is composed on the groundglass and properly focussed. The lens is stopped to the desired aperture. This done, the photographer studies the character of the subject and the general conditions of the light. Then with his head under the focussing cloth he notes the illumination of the subject on the ground-glass, which he attempts to compare with a standard degree of illumination that he carries in his mind. He attempts to make this comparison while his eyes are still adjusted to the more brilliant light outside the

focussing cloth. Would you vouch for the accuracy of his judgment under these conditions? We all know the apparent state of blindness that we experience when we enter a motion picture theatre from the bright light outside. It is a matter of minutes before we can distinguish anything but the brightly illuminated silver screen. After a few minutes the eyes adjust themselves to the subdued light and we can see more clearly—in fact we can see everything about us and there appears to be much more light than when we first entered. This same condition is present when we are making our comparisons of the illumination under the focussing cloth, and it is one of the prime reasons why photographers secure such widely varying results in the character of their negatives.

I have a friend who has made photography his "hobby," and he has devoted most of his spare time during the past six years to the making of pictures. He is a serious worker and a close student of the art—the same as many other amateurs who are trying to express themselves through the medium of photography. My friend was showing me some of his prints recently, and I could not help noting his remarks as he handed me each successive print. "I had waited for weeks for a certain atmospheric condition to express just what I wanted in this one, and one Sunday morning the conditions were just what I had been looking for. I made two exposures to be sure of getting just the effect that I desired. One was badly overtimed—this one would have been better with less exposure." Again: "I like this subject—the composition and lighting are especially pleasing, but the plate was badly undertimed. I am keeping this print for future reference, as I am going to make it over again some time." And so on throughout the list. If my memory serves me correctly, there were just three prints in that lot of twenty-odd with which he was satisfied—fourteen per cent! We talked "shop" the rest of the afternoon, comparing our methods of working, and the general run of conversation that usually follows the getting together of two camera fans.

That night I was thinking over the afternoon's visit and I made a mental inventory of my friend's photographic assets, which I may briefly summarize as follows: He is very artistic—quick to see the pictorial possibilities in a subject, and with a charming sentiment and feeling which he strives to express

A SWISS VALLEY.
LOOKING TOWARDS LAUTERBRUNNEN, SWITZERLAND.

HOMER S. CURTIS.

in his work. He is a careful and painstaking workman and a close student of things photographic. He knows just the effect that he wants and he is not satisfied until he has produced it. He is fairly well versed in the technique of photography, and is a constant reader of good and authentic photographic literature. And yet in his work he has failed in one of the most important things—he has failed to analytically apply the knowledge that he has. Let me explain just what I mean by a reference to the print first mentioned above. The subject was a landscape with some well-placed trees in the foreground and a most charming distance. The whole effect was beautified by the fog or haze that produced a wonderful atmospheric effect and really made the picture. To hold this distance in just the right degree of gradation was the whole problem in making the picture. The use of a light color screen would have made this a comparatively simple matter—K-1 would have been right—but in his hurry to make the exposure before the fog lifted, he had neglected to take his filters. To hold the distance without the filter would have necessitated a shortened exposure—slightly under-timed, which my friend informed me he thought he was giving, but he was not sure what the normal exposure should have been. He guessed.

With his plates exposed he hies himself to his dark-room to complete the first step towards his picture—the negative. He uses the tank method of development, and follows the maker's instructions to the letter. Thus we find him preparing his developer, weighing each ingredient to the exact grain. The water is measured to the required minim, and the whole concoction brought to the standard sixty-five degrees of temperature. The "book" calls for a full twenty-minute development, which he proceeds to give and settles himself for this period of happy expectancy while the "experience in the tank" performs the miraculous transition from plate to negative. And then there comes to his vision a lot of negatives, varying in the qualities desired as widely as the peoples of a city vary in their resemblance to each other. And the sad part of the story is that the greater proportion of the negatives are of the undesired quality. My friend is no different in this respect than hundreds of other amateurs—and professionals—who work entirely according to rule in a mechanical way and fail to apply their knowledge to the conditions at hand. They do not work understandingly.

JES' A BABY. JESSIE TARBOX BEALS.

And what lesson are we to learn from this? It is that we do not apply the knowledge we have, or that we have not the knowledge to apply. We are too prone to guess when we could be reasonably certain, and the most dangerous of these practices is the habit of guessing the actinic value of the light. In the example mentioned above, my friend would have been a lot more certain of success had he measured the value of the light, and computed his exposure correctly, and been less accurate in regard to his developer. He might better have taken a pailful of water, a spoonful of pyro, two handfuls of sulphite, a handful of carbonate and with a correct exposure he would not have gone far wrong in securing a negative. But he guesses with the factor of most importance, and it is not to be wondered that he gets negatives of varying quality and all sorts of prints therefrom, for in a measure he is working in the dark.

There would be some excuse for all this waste of time and energy, and we would sympathize with those working in the dark, if it were impossible to correct these errors. We can measure the light values with enough accuracy to insure uniform results and to make success fairly certain. There are numerous tables and exposure charts that give the values of the light for different seasons of the year, and the different hours of the day, that will be found a great help in calculating correct exposures, but they fall far short of being exact under the varying atmospheric conditions. The most reliable means to this end I have found to be the type of meter that makes use of a chemically prepared paper that is sensitized to register the strength of the light which alters the color of the paper in the degree that the light is actinic or non-actinic. Such meters as the Wynne, Hunter, Adams and Watkins are of this type, and will be found wonderfully accurate in this respect.

I have been professionally engaged in photography for the past twenty years and I cannot recall the time that I have been without a meter of this type. I use it—I rely upon it. There have been numerous times that my judgment has questioned the accuracy of the meter, and I have always found that my judgment has been in error.

GRAND CANON OF THE COLORADO FROM THE NORTH RIM. GEORGE L. BEAM.

HOMEMADE APPARATUS FOR ENLARGING NEGATIVES

By RALPH GOODALE

IN the 1914 issue of the *Annual,* A. E. Swoyer published a valuable article on the making of enlarged negatives. His method, in brief, was to place a small contact print in a post card projector, and to project an enlarged image from it upon a dry plate. Mr. Swoyer claimed that an enlarged negative preserved all the detail of the original negative, and that manipulations were more easily made upon the small contact print than upon a bromide. He was right. A bromide print does not compare in detail with a contact print from an enlarged negative; and the retouching, shading, and masking performed upon a small print, when caught upon a large plate, become for the future as automatic and simple as the printing of any detail in a contact print.

I would add that with an enlarged negative the final picture is not limited to bromide, but may easily be made in carbon, gum, seltona, or any other medium; that the small additional cost of the large dry plate is little, for most amateurs, compared to the usual cost of wasted paper in the bromide process; that amateurs who are devoted to the carbon process may avoid the double transfer by reversing the image on the enlarged negative; and that the exposure in the making of an enlarged negative may be accurately determined by a simple calculation.

Having no projector, I have made one of my own, shown in Figures 1 and 2; a small print, pinned upon the support in the window, receives the light from two 50-watt bulbs. My camera, with the back removed, rests upon the bracket and partly within the hood; the lens is properly focussed to throw an enlarged image of the picture upon a plate, which stands upon a movable easel.

If you care to imitate this device, make of good inch boards a box about as wide as the focal length of your camera lens, twice as high as wide, and twice as long as high. In case

RURAL WORKERS. C. E. WAKEFORD.

you do not know the focal length of your lens, make the box as wide as your box camera is long, or as wide as your bellows is long, when the pointer is at the "infinity mark."

Before nailing the box together, however, construct the combined hood and bracket shown in Figure 3, with an opening just large enough to permit the insertion of the camera-body when the back is removed. The hood should measure,

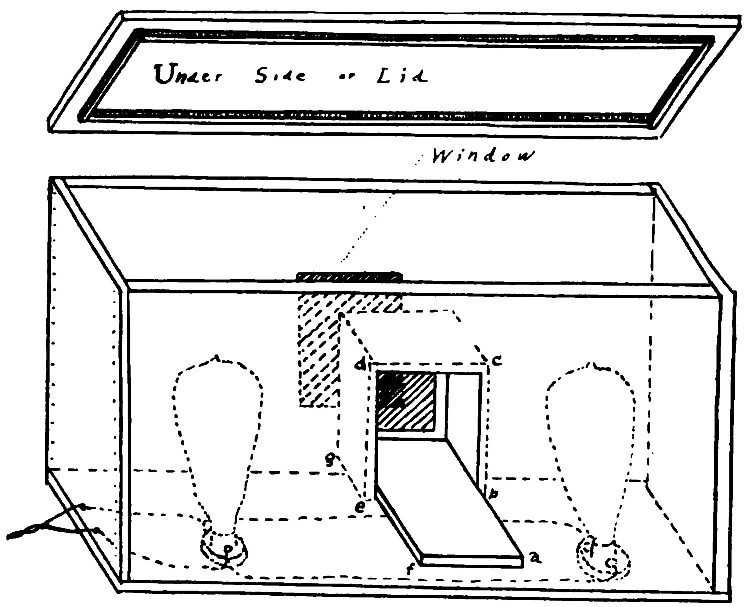


Figure 1.

from *c* to *g*, one-third the distance across the interior of the enlarging box.

With a box camera, focusing is accomplished by sliding the camera back and forth in the hood, with the lens pointing whichever way is suitable. The hood should be as long as the box of the camera, and must run through the front wall of the projecting box for half its length.

Cut in the center of the front board of the box a hole as wide as the opening in the hood, and as much longer as the thickness of the bracket *a b e f*. Insert the hood from the side that is to be within the box, with the bracket projecting and the edges *b c d e* flush against the front board. Nail the

hood in place, taking care that the bracket stands at an exact right angle to the board. Cut from hard rubber, red celluloid,

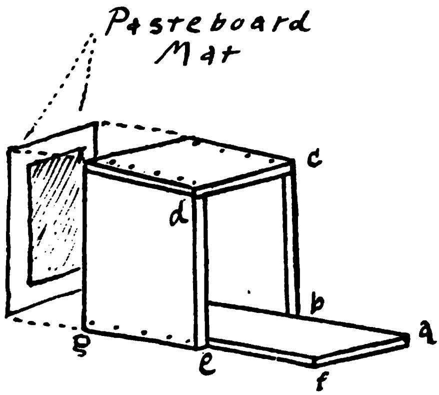


Figure 3.

or black paper a mat as big as the rear of the hood, with an opening a little smaller than the back of the camera, and glue it to the back of the hood.

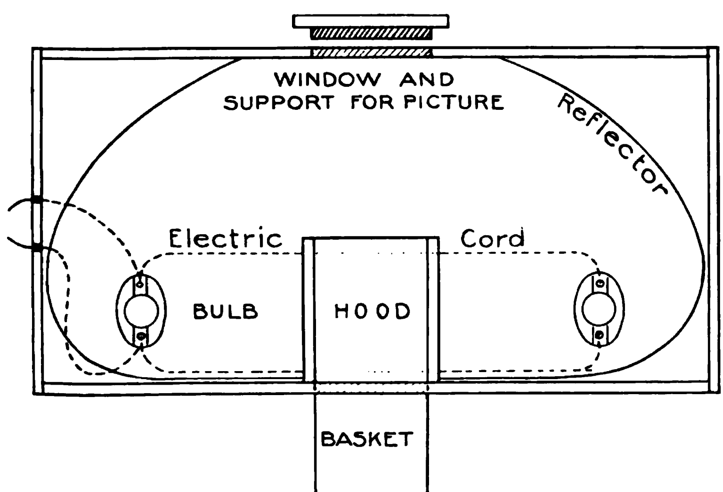


Figure 2.

In the center of the back board of the enlarging box cut an opening a little larger than the pictures made by your camera. This opening is for the insertion of the picture to

be enlarged, and should be directly opposite the hood in the completed machine. Save the block of wood from the opening, and glue it to a board an inch or so wider each way. You now have a support to which the pictures may be pinned, and which may be hinged to the opening like a door or merely fastened with snaps. If you prefer, you may omit the window altogether, and pin your picture to the inside of the back wall of the box.

On the bottom board screw two keyless electric sockets, one near each end, in such a position that the lights which they hold cannot shine directly into the hood. Wire the sockets in multiple, as shown in the diagram.

Now, paint all the wooden parts a dull black, both faces and edges, and nail the box together, using glue to tighten the joints. Leave the upper board loose for a cover, and fit small wooden strips on the under side near the edges to prevent the escape of light; if necessary, glue strips of felt on the lid where it meets the edges of the box. Run the electric cord through holes in one end of the box and join them to an electric plug.

For reflectors, cut white cardboard strips as wide as the inside depth of the box, and tack them in a curve so as to throw the light upon the picture. Remember that there should be no white object in a position to shine upon the lens.

Figure 4 shows a convenient easel. A small brad in the plate rest will hold the foot of the plate, and a sliding sleeve of black pasteboard, slightly notched, or of sheet iron, will hold the top. Paint your easel a dull black.

For a focusing screen, paste white paper over a discarded plate of the proper size. Rule the screen in black with cross lines parallel to the edges and a quarter of an inch apart. In the same way rule in red ink the black surface of your print carrier. By focusing the red lines upon the screen you may determine whether your easel stands properly, and also decide upon the degree of magnification at any particular distance from the box.

I prefer Solio or Disco for the small contact print; P.O.P. has greater latitude than developing papers, and the smooth surface offers no irregularities to show in enlargement. A slow plate, with its great latitude and its fine grain, is best for the enlarged negative. My favorite is the Cramer Process Plate.

T. W. KILMER.

It will be well to make a trial exposure at a certain magnification and a certain lens opening. By holding a paper before the plate while the exposure is going on, and moving

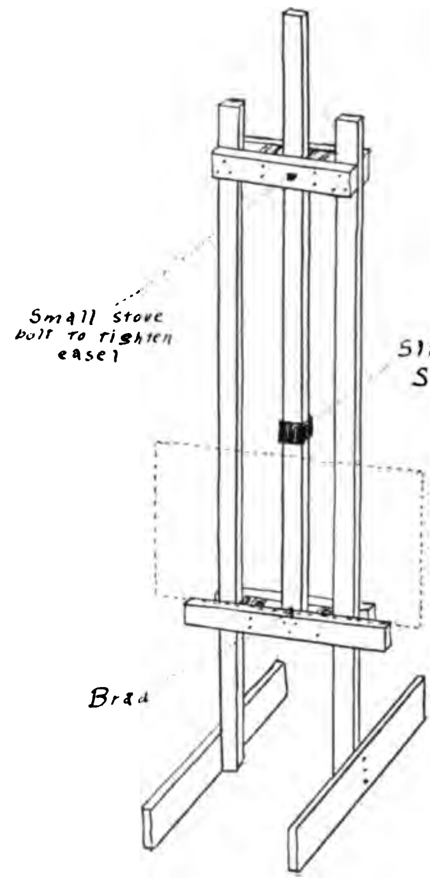


Figure 4.

it sideways at intervals of fifteen seconds, you may produce a graduated negative, one part of which will be perfect and will indicate the correct exposure for the given magnification and lens opening. Once the correct exposure under the given conditions is determined, you may easily make a chart that will indicate the time for any exposure; provided, of course, that you always use the same kind of plate and the same

AT DAWNING. CHAS. C. CAREY.

ASTERS. JAMES THOMSON.

size of lamp. In order to work out the chart for yourself, use the formula $\frac{X = n\ (1 + M)^4}{M^2}$, in which X is the time, in seconds, M is the number of magnifications, in diameters, and n is a certain number.* Suppose, for instance, you find that at F/11 for your lens the exposure time for three magnifications is 225 seconds. Then $n \frac{(1 + M)^4}{M^2}$, or $n \frac{(1 + 3)^4}{3^1}, = 225$, and $n = 7.9$; or for practical purposes $n = 8$. You may now

*That is, a picture two inches across, when enlarged so as to measure six inches across, is enlarged three times, and $M = 3$.

PORTRAIT OF A GIRL. Irving Berkey.

find the exposures for all values of M, using the stop F/11; and after that you may determine the exposures for other stops by the formula. The time varies with the square of the lens opening expressed by the focal system (or with the lens opening expressed by the uniform system).

If you are busy, however, or unmathematical, use my table, after multiplying all the exposure numbers by whatever figure you find necessary. Suppose, for instance, that your correct time for a three-times enlargement at F/11 is 175 instead of 210 seconds: multiply all the numbers by $\frac{175}{210}$, or $\frac{5}{6}$.

No. of Magni-fica-tions	Lens openings, U. S. (approximate openings, focal system, in parentheses)					
	(*F*6/8)	(*F*4/8)	(*F*8/11)	(*F*16/16)	(*F*32/22)	(*F*64/32)
	Time, expressed in minutes and approximate fractions					
1	¾	1	2	4	8	16
2	1	1⅜	2¾	5½	11	22
3	1⅓	1¾	3½	7	14	.....
4	1¾	2⅜	4¾	9½	19	.....
5	2⅜	3⅙	6⅓	12⅔	.....	.....
6	3⅛	4⅛	8¼	16⅛	.....	.....
7	3⅞	5⅛	10¼	20½	.....	.....
8	4¾	6¼	12½	25	.....	.....

Fasten your chart to the lid of your box, and trust it; if your experience is like mine—and I waste a good many plates in other ways,—you will not lose a negative by over- or under-exposure.

SILHOUETTES BY PHOTOGRAPHY

By JULIEN J. PROSKAUER

VIRTUALLY everything modern has had its conception in something of the days of old. Therefore, it is entirely fitting and proper that before we delve into the making of photographic silhouettes, we explain just what silhouettes are, and wherein they first found use and favor.

Years before the discovery of photography outlines of a shadow on the side of a wall were copied by artists on white backgrounds and used as pictures or representations of those throwing the shadows. After that came Etienne de Silhouette. French Minister of Finance in 1759, who made silhouettes by cutting shadow portraits from black paper with a pair of scissors. Silhouette made a fad of his knack of cutting pictures from paper, and the name of Silhouette was given to the finished result.

A silhouette consists of a uniformly dark image on a white ground, or a white image on a dark ground, though the former is more extensively in vogue today. Photographic silhouettes are easiest made to give the first effect, and that is what we will take up today.

Silhouettes by photography made by flashlight are the surest and easiest, though any kind of light suitable for photography may be used in making silhouettes. The writer, who has for years been interested in silhouette making the photographic way, always works with flashlight as the illumination source.

To make a silhouette, two rooms, with a doorway between are needed, if flashlight is to be used, and the writer will not presume other than that illumination will be used. The doorway must be wholly covered with white cloth (an ordinary bed sheet is used to best advantage). This cloth must be stretched smooth so that no wrinkles can possibly show.

The flashlight is placed in one room and the camera and subject in another. Pose the subject before the sheet facing profile to the camera. In arranging the subject be sure that no part of even the eyelashes nearest the sheet show, for if they

JOAN AND PAT. BREAD 'N' SUGAR 'N' MILK.

Illustrating article "Silhouettes by Photography," by Julien J. Proskauer.

do, the true silhouette effect is lost, and the exposure is of no value.

Place the flashlight so that an imaginary line drawn from the camera to the flashlight, through the sheet and through the subject, would be exactly straight. Notice the accompanying diagram (Figure 1)* and follow it in making silhouettes. You cannot go wrong.

"Joan and Pat" (Figure 2) under the title of "Bread 'n' Sugar 'n' Milk" won first prize in a monthly competition of American Photography, and a flashlight manufacturer wanted to buy the negative for advertising purposes. This is stated here simply to show that money may be made by silhouette makers because of the novelty of effect.

"Joan and Pat" was made on a 5x7 Portrait Film and

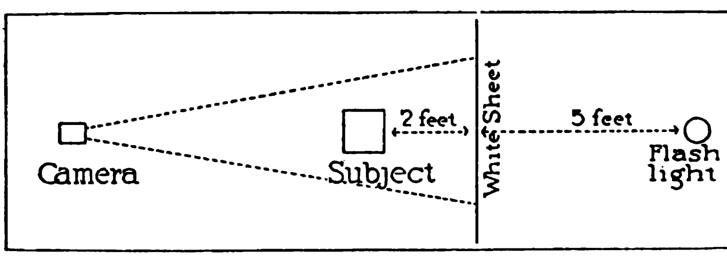


Figure 1.
Silhouette Arrangement.

developed in Pyro-Elon for the gradations of blackness in the heads and the illumination was a No. 3 Eastman Flashlight cartridge.

"Dick" (Figure 3) was made with a 3a Kodak and Portrait Attachment on regular Autographic Film. "Gretchen" (Figure 4) was made with the same Kodak. The illumination on these was a No. 2 Eastman Flashsheet.

The method of working on these three pictures was identical. A sheet was hung as mentioned above, and the subjects posed at exact right angles to the cameras. The flashlight was placed in the room behind the sheet and just before the exposure the lights in all rooms were turned off. That is done to prevent any false or strange shadows forming while waiting for the flash to go off.

**The sketch used herewith is from "How to Make Good Pictures," published by the Eastman Kodak Company.*

One must pay particular attention to avoiding reflections from walls, pictures, glass book cases, etc. The best doorway to use for your silhouette work is one near a corner of a room in which the wall paper is rather dark.

In developing silhouettes be sure to make the negatives extremely contrasty with great steps between the white of the ground and the black of the subject. If you develop a soft negative the sheet may print in somewhat and spoil the

DICK.

Figure 3.

effect. Use double or triple strength developer to be safe in getting enough contrast, and carry the development until the background blackens.

You will find that it will be necessary in many cases to mask the lower part of the silhouette. This may be done, as was the case in "Dick" and "Gretchen", with a paper mask, or as was the case in "Joan and Pat" with opaque. Any opaque will do, but the writer finds the Eastman Opaque runs freely and is easiest and best to use.

The pictures of "Dick" and "Gretchen" are printed on Regular Velox. This paper is contrasty enough to get the

best effect of the silhouette, and the writer recommends it. "Joan and Pat", printed on Hard X, or No. 4, Azo, another extremely contrasty paper, shows up excellently.

In closing let me caution the silhouette maker not to include too much in his picture. Single heads are simplest to make and are very effective, though for sale or other purposes, such as magazine competitions, two may be used.

Figure 4.
GRETCHEN

The flashlight should be about 4 feet to 6 feet from the sheet on one side, and the subject from two or three feet on the other, depending entirely on the size camera used, or how many heads are to be included, and what size space you have in which to work.

Silhouettes by photography are easy to make, pleasant to look upon, novel in effect and it is the writer's belief a mighty nice branch of photography, though little experimented with in late years.

LEO REX.

EUGENE R. HENRY

COLOR IN THE NEGATIVE

By J. E. FOSS

COLOR in the negative is not as well known or used since the advent of the acid fixing bath, as the hardener containing both acid and sulphite would bleach out or remove most of the color.

The development of Aerial Photography during the war, brought the stained negative back into use, and by its use saved many otherwise hopelessly undertimed negatives.

Pyro, of course, is the reducer used for obtaining stained negatives.

Formulae.

A.	Sodium Bisulphite	8	grams
	Metol	7	"
	Pyro	8	"
	Pot. Bromide	3.5	"
	Water to	500	c.c.
B.	Sodium Carbonate	90	grams
	Water to	500	c.c.
C.	Sodium Sulphite	90	grams
	Pot. Bromide	2	"
	Water to	500	c.c.

For Use.

1.	Staining Developer.		
	A	1	part
	Water	3	parts
	B	4	"
2.	Non Stain.		
	A	1	part
	C	1.5	parts
	Water	4	"
	B	4	"

As most of us know, the negative developed with pyro, will give an image having more or less yellowish color, according to the amount of sulphite used, the yellow color being due to an oxidation product of the pyrogallic acid which is deposited

HOME DUTIES. P. F. Squier.

along with the silver. It is possible to show this very clearly by removing (bleaching) the silver and leaving an image consisting of the yellow oxidation product only.

Prints can be made from negatives so treated, and this is a good way to treat microscopic negatives and slides wherein a fine grain is desired. Owing to the fact that printing papers are sensitive chiefly to blue light which is strongly absorbed by this yellowish color, a yellow negative appears much denser when printed than it does to the eye, and the yellowness can be measured by finding out how dense the negative is when printing as compared with its visual density.

Thus, if a negative of a given color proved on trial to be twice as dense as it appeared to the eye, we should say that it had a color index of 2. If we take a pyro developer containing five parts of pyro per thousand and ten parts of carbonate, and then vary the amount of sulphite from none to fifty parts per thousand, we find that the color index varies as follows:

Sulphite Parts per 1000	Color Index
50 " "	1.16
25 " "	1.24
15 " "	1.30
10 " "	1.45
5 " "	1.80
0 " "	2.75

From this table we see that when using fifty parts per thousand of sulphite a pyro negative will be gray, and will print almost as it appears to the eye. With fifteen parts it will be 30% stronger in printing than to the eye (a good color for portrait negatives 1.30 to 1.50) and when the sulphite is less than five parts per thousand the negative will print just as if there were two negatives, without the color, put together for printing, even a very thin negative with this strong color printing up well. The stain developer is the finest way I have ever found for obtaining snappy negatives from high speed exposures that are bound to be under-timed.

Local reduction may be done on the stained negative by using some one of the well known stain removers. Stained negatives should be fixed in a plain hypo bath, 35% being the best working strength.

ARCHITECTURAL PHOTOGRAPHY

By MARK W. STEVENS

IT would probably come as considerable of a surprise to the average commercial photographer, if he should read this, to know that the work he turns out of completed buildings is quite looked down upon by the better architects; however, they take it because they are unable to command the services of a regular architectural photographer.

In the photographing of a finished building the architect does not desire a print showing every stick and stone in the structure—usually quite flatly lighted, and with a minimum of shadow. What is wanted is a print giving the *effcct* of the building as the average passer-by will see it. The form and texture must be preserved, and it must be attractively lighted. That is, there must be enough shadow present to throw into relief the cornice, mouldings, pillasters, and any carving which may be on the structure.

The architect studies his lighting in designing a building and proportions the depth of the carvings, pillasters, and mouldings, etc., to accord therewith. The depth of these features, and the amount of shadow which they cast, are not a matter of haphazard guess in the office of a good architect. And, above all things, the proper drawing of the building must be preserved. This matter of drawing is something which means nothing to the commercial photographer—all that he is anxious to do is to get all of the building on the plate.

In this work a lens of as long focus as possible should be employed. Then one will not turn out prints in which a long building looks as though the far end were half a mile away instead of only half a block. Anyone who has looked over architectural photographs will know just what I mean. We all know that the wider angle lens we use on a building the greater the effect of size of the front of the structure, and the smaller the rear portion looks in proportion to the front. Hence, the architect who demands good work, will appreciate much more thoroughly a print from negative made with a

Figure 1.
Illustrating article "Architectural Photography," by Mark W. Stevens.

comparatively long focus lens. Most of my work has been done with a 7½″ lens on a 4 x 5 plate, and the resulting negative projected to an 8 x 10 print. The average "wide-angle" lens should be taboo except when the space will not permit the use of a narrow angle lens.

There are, of course, times and seasons when the wide-angle lens is the only one possible to use under the circumstances, and in this case its use is tolerated. Also, a fully corrected anastigmat is not always a necessity. In fact it is easier to preserve the "texture" of a building with a moderately "soft-focus" lens, such as the new Graf "Variable." I have also used a Wollensak "Verito" at F/6 with very pleasing results. The "Variable" is, however, a much easier lens to use; and as it is both a lens of variable softness and perfect anastigmat in one lens, it is a very desirable piece of equipment.

The old idea that it was necessary to lug around an 8x10, or larger camera, for this work is fast becoming a thing of the past. In fact, the man who is probably the best architectural photographer in this country carries nothing larger than a 5x7, and delivers projected prints of about 11x14″ size. He says that there is no use in carrying a large equipment when the smaller one will give just as satisfactory results.

Prints No. 1 and No. 2 will illustrate what I mean by a good lighting. They were taken within a few minutes of each other, but one is very attractive, showing, as it does, the shadows of the recessed windows, buttresses, mouldings, etc. The other is a failure as an architectural photograph. It has fine massing, and most charming dominant verticals, suggesting strength and mass, but it fails on account of the flat lighting. About six-thirty in the evening is the correct time to make this picture, then the sun casts the shadow of a nearby tree on the surfaces, breaking it up into masses of light and shade—something that is really worth looking at.

The question of lighting is one that cannot be too carefully studied. In the main, no matter how carefully one has exposed, developed, and printed the result will be a failure, artistically, if the lighting is not good. It is well, whenever one has a bit of work of this nature, to pass the building a number of times at different hours of the day. In this way one will soon see at what hour the building will be the best

Figure 2.
Illustrating article "Architectural Photography," by Mark W. Stevens.

lighted, and so save trouble in lugging apparatus around on a fruitless errand. In general, buildings facing north will give the most trouble. May, June and July are about the only months in which these buildings are attractively lighted, and then only in the late afternoon. There have been one or two buildings for which I have waited nearly six months in order to get a thoroughly satisfactory lighting. Buildings facing south, east, or west are well lighted at some hour of the day on every bright day of the year.

And right here it might be well to say that for anyone taking up architectural photography, either as a hobby or with the intention of specializing in the work as a profession, there are a number of good works on architecture in every public library, and I would most heartily recommend the careful reading of at least some of them that one may familiarize oneself with what good architecture is. "House and Garden" and the "House Beautiful" magazines often have good illustrations of houses, both exterior and interior. These are worth studying as the photographs have been made by some of the best workers in this branch of the art.

If you have the opportunity to see the work of John Wallace Gillies of New York, make the most of it. This man, to my mind, is one of the best architectural photographers in the country today. He knows architecture, and he knows photography. He has a most delightful sense of values in light and shade, and the way he interprets textures in a building, or wall surface, is a joy. When one sees a photograph by him of a white building, there is no question as to whether it be marble. limestone, stucco, or wood, and yet not because of any insistent detail. He has preserved the texture, and this is something that all of us who aspire to do successful work must endeavor to do likewise.

As to apparatus and methods of working, each will have to use what he has, or can afford to buy. The camera need not be large, but must have draw enough to accommodate as long focus lenses as will be used; a swing back or a very large rise to the front-board (my 4 x 5 has better than 3" rise); and a reversible or revolving back. The subject of lenses has been treated in an earlier paragraph. As to sensitive material, use that with which you are most familiar. However, preference should be given to double-coated plates, or to such

Figure 3.
Illustrating article "Architectural Photography," by Mark W. Stevens.

film as Eastman's on account of the non-halation qualities. It should also possess good orthochromatic quality, as it will be often necessary to use filters to get satisfactory rendering of sunlight and shade. Development should be rather on the soft side, and for printing use your own judgment as to the brand of paper—but *do not* use glossy except the print be for reproduction. A good strong tripod is a necessity, and should be equipped with rubber tip when interior work on tile or marble floors is in hand. Full exposures should be the rule.

Print No. 3 is an example of difficult interior to handle. The east window, over the altar, being brightly lighted from the daylight outside, and the inside quite feebly lighted through the colored windows of the clerestory. The problem was solved, after many experiments with varying exposures, developers, and methods of development, in an effort to get detail in the woodwork, and at the same time preserve the east window. The final solution was to place an electrically fired flash-lamp behind the column and Bishop's Throne (at the right), and a corresponding flash-lamp at the left side of the Choir, opposite the first. These two lamps were fired simultaneously from the lighting circuit, just at the end of the daylight exposure on the window. A Wratten & Wainwright Panchromatic plate was used in conjunction with a "K-3" filter, the flash being large enough to allow for the depth of the filter.

Architectural photography is a large subject, and in this short article I have been able to touch only a few of the high spots. As a hobby it is fascinating and as a profession promises well. A man who has made a study of architecture and photography, and is able to turn out the work that will satisfy the discriminating architect, or owner, will be able to command excellent prices for his work—prices far above what the average commercial photographer will charge—and which said architect, or owner, will cheerfully pay.

CAROLINE. LEONID FINK.

CARBON AND CARBRO

By A. C. BRAHAM, F.R.P.S.

WHAT'S in a name? Why Carbon? Names are frequently of interest as indicating the original properties or origins of things and of processes.

Calico no longer comes to us from Calicut and muslin is not generally imported from Moussul. Carbon does not directly indicate the nature of a photographic process, but is only a negative description signifying that the print is not due to a silver compound.

Pigment printing or "Photography in Pigments" to quote the title of an early book on the subject, is a name which describes and does not hide the original conception and is, I think, preferable to the generally used term "Carbon."

Carbro is a trade name which is unusually explanatory of the nature of the print to be made *Car*bon from *bro*mide.

Carbon, to use the popular description, is a process that merits and commands the attention of every photographic worker who desires to attain beauty and permanence of results, as well as utility in his or her productions.

It provides a means of artistic expression not to be rivalled by any other process, and therefore appeals most strongly to all those who desire the means of rendering their ideas in the most varied, artistic, and individual manner.

Various shades or hues of black, brown, red, blue and green, provide a range of some forty colors that are purchasable and a number of transfer papers differing in tone, in texture, in surface, and in substance equally numerous, so that there is practically no limit to the varied results that can be produced by the conjunction of appropriate tissue and transfer, and bizarre or eccentric effects are available as by developing black pigments on gold surface paper, blue or green on silver surface.

Precise instructions should be sought in the lists or pamphlets issued by the manufacturers. Briefly the method of work is that pigmented paper is sensitized by immersion in a solution of bichromate of potash, dried and then exposed under a

negative to the action of light which insolubilizes the pigmented gelatine proportionately to the densities of the negative.

The printed pigmented paper is squeegeed on to the transfer paper chosen and then developed by immersion in hot water, which washes away all those soluble parts not needed to form the picture.

The process is simple, but drying the tissue under favorable conditions and correctly estimating the exposure needed provide possible pitfalls for the beginner, which experience readily avoids. These facts, however, prompt a number of admirers of Carbon to prefer the Carbro process which yields prints identical with those produced by Carbon printing, the same pigmented and transfer papers being used.

The method differs in that the Carbro is produced, not by the action of light, but by a chemical change which is induced by contact between a bromide print or enlargement, and a piece of pigmented paper that has been saturated with a bleaching solution containing bichromate, bromide and ferricyanide of potassium.

A chemical change takes place with the result that the bromide print is bleached, and at the same time the gelatine of the pigmented paper is rendered insoluble proportionately to the density of the deposit of silver in the bromide print.

The pigmented paper remains in the above solution for three minutes, and then after a few seconds draining is immersed in a second bath containing formaldehyde and acetic and hydrochloric acid for an average time of twenty seconds. It is then squeegeed on to the bromide print and remains in contact for fifteen minutes.

Pigmented paper and bromide are then separated and the former squeegeed on to the transfer paper it is intended to use and placed between blotting boards for half an hour, then developed in the manner usual with Carbon prints.

The bromide, after washing in running water, should be redeveloped, and is then ready for use for making further impressions.

The whole process is entirely independent of dark-rooms or of light action, and so can be worked at any time in any available room.

NIGHT PHOTOGRAPHY

By A. W. DREYER

A LITTLE known side of photography is the making of pictures at night. To the uninitiated it will seem strange and bizarre that photographs can be made out doors after dark without the aid of flashlight. Repeatedly have passersby stopped and asked questions as to the reason and technique of making pictures at night. Most of them have extremely amusing questions to ask.

Once you have become acquainted with the beauty of night photography, daylight work will appear tame and commonplace besides. I do not know a pleasure more appealing than the making of outdoor pictures at night. It is with a certain fascination that I go out to woo the beauty of night, and the pleasure on beholding the finished print is worth all the effort and trouble gone to.

Almost any camera or lens will do. I prefer a 5 x 7 view camera, it is a bit heavy, but it gives results. Your Brownie will do. However, an exposure that will require thirty minutes with same, can be made in three minutes with an extra fast lens. As you will readily see the working aperture of the lens is a very serious item in night work. Do not be discouraged if your lens is not a fast one. If you are able to make good pictures by day, you will be able to do equally well at night, if you but persevere.

A single lens, the ordinary meniscus on the cheapest camera, gives the most brilliant picture when working against a bright light, because it is free from all internal reflections from which the doublet can not escape. The rapid rectilinear, as well as the high priced anastigmat, has at least one reflecting surface, and sometimes a greater number, from which a half or large circle is formed, when an exposed light is included in the picture. A sort of a "sun dog" as it were. This can very often be avoided by shifting the camera to right or left so that the troublesome reflection will be cast upon the walls of the bellows, and not upon the sensitive film.

Figure 1.

LIGHTS ALONG THE RIVER.

Illustrating article "Night Photography," by A. W. Dreyer.

The really big problem of night photography is to know what not to take. The beginner is apt to waste a lot of time and material photographing electric signs, and other subjects, equally as inartistic. It seems to be *the cave man period* of night work, and in most cases must be gone through with, and the sooner the better. You will then very likely discover that there is an unexplored field before you for real artistic expression.

In night photography you have not a lot of detail as in daylight pictures, which obtrudes itself upon the eye, to the detriment of real artistic effect. You have instead a mass of darkness balanced by one or more highlights, the judicious placing of which will give you a result that is surprisingly beautiful. Provide yourself with an electric flashlight although not absolutely necessary. You will find it a great convenience. Make your exposures by capping and uncapping the lens, as you may be in doubt as to whether the shutters are *set* or not. By using a cap, you are positive as to what you are doing. By all means have the cap loose fitting so that you will not jar the camera, when putting it on and off. It may be necessary to cap the lens while you are requesting some auto driver to park his machine some other place, and not directly in the foreground of your picture. Always shade the lens from moving lights, as otherwise they will leave a streak upon the print. This includes street cars and automobiles and other bright lights. Do not cap lens when shading for a moment only. Simply hold plate-holder slide, or your hat, in front of lens, but do not touch the camera. By so doing you might move the camera, and the result will be a picture with a double outline.

Do not attempt exposures in windy weather as you will surely fail. Unless you have a box camera, and place same on something solid with a heavy object on top of it, you will not be able to get clear and sharp pictures. Vibration is the bane of night work, and must be carefully guarded against.

The writer uses portrait cut film exclusively. They are so very superior to plates for this kind of work. After a thorough trial of both you will never think of using anything else. Roll film is very good if you have this kind of camera, but for all who use a view camera, cut film is the best. You may use your ordinary plate holder to hold cut film by simply pro-

Figure 2.
ENTRANCE TO APARTMENT HOUSE. F6/8; time 10 minutes.
Illustrating article "Night Photography," by A. W. Dreyer.

viding yourself with a film sheath especially made for this purpose. Failing this, take a piece of cardboard a trifle thinner than a dry plate, the exact size of your film, then with a few short pieces of lantern slide binding strip attach same to cardboard a few inches here and there.

I have repeatedly used this method with good results. On the small sizes it is not necessary to do this, just slip in loosely with cardboard, and the trick is done. Use black paper, which separates the film in the package, underneath film in plate holder, as this will greatly help to prevent halation.

To develop, use any standard developer dilute with three times usual quantity of water, and let film soak. Needless to say, development must be prolonged accordingly. In warm weather be sure to keep temperature of all solutions below 75 degrees. Otherwise the long soaking with high temperature will ruin film. I use Pyro, and find the same gives best results.

Developing paper is not suitable for the printing medium; it is entirely too harsh. A negative of a night subject is, to say the least, extremely contrasty, and there is nothing for contact printing equal to the ordinary silver print-out paper. It gives you more than you believed that your negative possessed. It gives you transparent shadows, and the delicate shimmer of the moonlight upon the water will be faithfully recorded. By all means enlarge your pictures, as this brings out their beauty wonderfully, but upon some soft working paper. The advanced worker will do well to make an enlarged negative and reproduce in carbon or gum. Figure 2 accompanying this article has complete data on exposure, and will serve as a guide.

PATCHEN PLACE AT NIGHT. SOPHIE L. LAUFFER.

American Annual Formulary

In the following section we have gathered together a typical collection of Formulae and Tables, which will assist the photographer in his every-day work. It will be noticed that makers' formulae are omitted. These can best be obtained by direct application to the makers. The appended formulae are selected from the working methods of practical photographers.—Editor.

TRAY DEVELOPERS FOR PLATES AND PAPERS

Amidol. (W. M. Keck).—Amidol, 20 grains; sodium bisulphite (dry), 40 grains; sodium sulphite (dry), 60 grains; potassium bromide (powdered), 1 to 3 grains; water, 4 ounces. For all kinds of developing paper. Expose so that the development will be complete in twenty to thirty seconds. The tone is a blue black.

Amidol Universal Developer. (W. A. Alcock).—Water, 20 ounces; sulphite of soda (dry), ¾ ounce; Amidol, 50 grains; potassium bromide, 10 grains; citric acid, 20 to 40 grains. Splendid developer for papers intended for bromoil. Expose so that the image first shows in thirty seconds and develop for four minutes. Gives good tones in hot or cold hypo alum, and nice soft negatives. Splendid in hot weather as minimizes danger of frilling owing to lack of carbonate.

Diamidophenol. For Paper (Edwin Loker.)—Water, 20 ounces; sodium sulphite (anhydrous), 1½ ounces; sodium bisulphite, 10 drams: bromide potassium, 10 grains. To use, take 2 ounces and add 6 grains diamidophenol.

Ferrous Oxalate. For Papers (M. G. Lovelace).—No. 1. Hot water, 1000 CC. Dissolve ferrous sulphate, 250 grams; add slowly sulphuric acid, 3 CC. No. 2. Potassium oxalate (neutral), 250 grams: potassium bromide, 1 gram; hot water to make 1000 CC. Add 1 part of No. 1 to 4 parts of No. 2. After development wash in acetic acid stop bath.

Hydroquinone. (Max Gartner).—Solution No. 1. Water, distilled, 20 ounces; hydroquinone, 160 grains; sodium sulphite (anhydrous), 2 ounces citric acid, 60 grains; potassium bromide, 40 grains. Solution No. 2, water, distilled, 20 ounces; caustic soda (sticks), 160 grains. For use take No. 1 one part, No. 2 one part, and water two parts.

Hydrochinon.—For over-exposure plates to obtain contrasty negatives (B. H. Allbee).—No. 1, water, 8 ounces; sulphite of soda (anhydrous), ½ ounce; hydrochinon, 80 grains. No. 2, water, 8 ounces; carbonate of soda (dry), 1 ounce; potassium bromide, 40 grains. Take equal parts of No. 1 and No. 2. Temperature, 70 degrees.

Metol (H. W. Hales).—Metol, 60 grains; warm water, 16 ounces; sulphite of soda (anhydrous), ½ ounce; carbonate of soda (dry), ½ ounce. Dissolve metol in warm water, then add the sulphite and carbonate in order named. Cool. Can be used repeatedly. For developing papers add a few drops of 10 per cent. solution of bromide of potassium.

Metol-Hydroquinone for Orthochromatic Plates.—Water, 20 ounces; metol, 14 grains; potassium metabisulphite, 18 grains; hydroquinone, 56 grains; sulphide of soda (anhydrous), 1 ounce; carbonate of soda (dry), 1¾ ounces. Use 1 drop of a 10 per cent. potassium bromide solution to each ounce only if necessary.

Metol-Hydroquinone. For Paper (M. Gartner).—Water, distilled 3-ounces; metol, 15 grains, sulphite of soda (anhydrous) 1 ounce; hydroquinone, 60 grains; sodium carbonate (dry) 6 drams (for contrast use 1 ounce); bromide of potassium, 5 grains. Dilute this stock solution with an equal amount of water.

Developer for Commercial Work. (Max Gartner).—Water, distilled, 100 ounces; Ortol, ½ ounce; hydroquinone, 2 ounces; sulphite of soda; anhydrous, 8 ounces; carbonate of soda, anhydrous, 12 ounces; bromide of potassium, ¼ ounce. For plates use full strength.

Para-Amidophenol. (M. G. Lovelace).—Dissolve 150 grains sulphite soda (anhydrous) in 800 CC. hot water; add 20 grains para-amidophenol; dissolve 8 grains lithium hydrate in 100 CC. water, and add until precipitate formed is dissolved; then add water to make 1000 CC.

Pyro. For Prints (M. G. Lovelace).—No. 1 Pyro, 12 grains; sulphite soda (anhydrous), 80 grams; potassium ferrocyanide, 2 grams; water, 500 CC. No. 2 Sodium hydrate, 4 grams; water, 500 CC. To use, one part each with water 2 parts. Add 3 drops saturated solution bromide of potassium to every 400 CC. of developer.

Pyro. For Night Subjects (Robert Dykes.)—Stock solution—Pyro, 1 ounce; potassium bromide, 60 grains; potassium meta-bisulphite, 50 grains; distilled water to make 12 ounces. No. 1. Take stock solution 3 ounces, add 2 ounces boiled water. No. 2. Sulphite soda (anhydrous), 1 ounce; carbonate soda (dry), 1 ounce; water (boiled) to make 20 ounces. For use, 4 dram No. 1 to 5 drams No. 2 in 16 ounces of water.

Pyro. For Overtimed Plates (J. D. Elliott).—Sulphite soda, 40° solution, 4 ounces; water, 4 ounces; pyro, 10 grains. Immerse plates in this solution for 20 minutes in the dark; then add to above solution ½ dram carbonate soda, 20° solution. When image appears add one more dram of the carbonate soda solution.

Pyro. (W. M. Keck).—Pyro, 20 grains; sodium carbonate (dry), 40 grains; sodium sulphite (dry), 60 grains; water, 16 ounces. For either tray or tank development. Time six minutes.

Pyro Tray Film Developer. (J. E. Carson).—No. 1 solution, boiled water or rain water, 8 ounces or 240 C.C.s.; potassium metabisulphite, 60 grains or 3.55 grams; pyro, 120 grains, or 7.10 grams. No. 2 stock solution; boiled or rain water, 8 ounces, or 240 C.C.s.; sulphite soda anhydrous, 328 grains, or 21⅛ grams; carbonate soda, 219 grains, or 14¼ grams. For developing use half ounce or 15 cubic centimeters of each solution, and four ounces or 120 C.C.s water. Develop for five minutes at 65 degrees.

Pyro-Metol. For plates (H. M. Long).—A. Water, 22½ ounces; metabisulphite, 2 drams; metol, 60 grains; pyro, 1 ounce. B. Water, 16 ounces; sulphite soda (anhydrous), 2 ounces. C. Water, 16 ounces; carbonate soda (dry), 1 ounce. Normally used 1 ounce of each stock to 16 of water.

TANK DEVELOPERS FOR NEGATIVES

Metol-Hydro (Frew).—Water, 12 ounces; metol, 7½ grains; sulphite soda (anhydrous), 274 grains; hydroquinone, 30 grains; carbonate soda (anhydrous), 150 grains; bromide potassium, 2 grains. For use to each ounce of above add 4 ounces of water; temperature, 65 degrees; time, 12 minutes.

Monomet-Hydro-Pyro (John Boyd).—Monomet, 4 grains; hydroquinone, 4 grains; pyro, 4 grains; metabisulphite potassium, 4 grains; carbonate of soda, dessicated, 40 grains; sulphite of soda (anhydrous), 60 grains; bromide of potassium, 1 grain; water, 4 ounces. For tank development use 28 ounces of water. Development 20 minutes at 65 degrees.

Pyro (George D. Jopson).—No. 1. Water, 16 ounces; meta-bisulphite of potash, 70 grains; pyro, 1 ounce; bromide potassium, 8 grains. Mix in order given. No. 2. Sulphite soda, 60° test. No. 3. Carbonate soda, 40° test. To use, mix 2½ ounces of No. 1, 2 and 3 in rotation, add 57 ounces of water. Develop 20 minutes at 65°.

Rodinal or Activol.—Water, 60 ounces; rodinal or activol, 1 ounce; temperature, 65 degrees; time, 25 minutes.

DEVELOPERS FOR LANTERN SLIDES

Hydroquinone (B. H. Allbee).—No. 1. Hydroquinone, 150 grains; metabisulphite potash, 10 grains; bromide potassium, 50 grains; water, 20 ounces. No. 2. Sulphite of soda (anhydrous), 1 ounce; caustic soda, 100 grains; water, 20 ounces. Take equal parts of No. 1 and No. 2.

Hydroquinone. One Solution for Warm Tones (A. H. Farrow). Hydroquinone, 1 dram; sulphite of soda (anhydrous), 2 drams; carbonate of soda (dry), 4 drams; bromide of potassium, 20 grains; water, 12 ounces.

Hydroquinone. For Colder Tones (B. H. Allbee).—No. 1. Hydroquinone, 60 grains; sulphite of soda (anhydrous), 1 ounce; citric acid, 10 grains; bromide potassium, 10 grains; water, 10 ounces. No. 2. Carbonate of soda (dry), 1 ounce; water, 10 ounces. Use equal parts.

FIXING BATHS AND HARDENERS

Fixing and Hardening Bath. For Plates, Films and Papers. (W. A. Alcock).—In hot weather, hypo, 1 lb.; epsom salts, 1 lb.; water, 100 oz. In cold weather, hypo, 1 lb.; epsom salts, ½ lb.; water, 100 oz.

Acid Fixing Bath (Carbutt).—Sulphuric acid, 1 dram; sodium hyposulphite, 16 ounces; sulphite of soda (anhydrous), 2 ounces; chrome alum, 1 ounce; warm water, 64 ounces. To prepare the bath, dissolve the hypo in 48 ounces of water, the sulphite of soda in 6 ounces; mix the sulphuric acid with 2 ounces of the water and pour slowly into the sulphite solution and then add to the hypo solution. Dissolve the chrome alum in 8 ounces of water; add to the bulk of the solution and the bath is ready for use.

Fixing Bath for Lantern Slides (B. H. Allbee).—Sulphuric acid, 1 dram; hypo, 16 ounces; sulphite of soda (anhydrous), 1 ounce; chrome alum, 1 ounce; water, 64 ounces.

Plain Fixing Bath.—Dissolve 1 pound of sodium hyposulphite in 2 quarts of water, or 4 ounces of the hypo in a pint of water, according to the bulk of the solution required.

Hardener for Fixing Bath (Beach).—Water, 40 ounces; sulphite of soda (anhydrous), 3 ounces; powdered alum, 16 ounces; acetic acid, 40 ounces. Add in the order given and shake well until dissolved. Of the above add 16 ounces to each gallon of hyposulphite of soda solution, testing 70 to 80 degrees.

Hardening Negatives.—Immerse them for a few minutes in formalin, 1 ounce; water, 30 ounces.

Short Stop, removes developer stains; renders an acid fixing bath unnecessary when making D. O. P. or bromide prints, and destroys stains on both prints and fingers. (J. E. Carson)—Potassium metabisulphite, 1 ounce or 30 C.C.s.; water, 32 ounces, or 960 C.C.s. When thoroughly dissolved add 10 drops C. P. sulphuric Acid. This bath should have a light sulphur dioxide odor after standing awhile. If not, add acid drop by drop until odor appears.

INTENSIFICATION

Intensifier, One Solution (F. M. Steadman).—No. 1. Bichloride of mercury, ½ ounce; water, 10 ounces. No. 2. Iodide of potassium,

5 drams; water, 1½ ounces. Add to No. 1. No. 3. Hyposulphite of soda, 1 ounce; water, 2½ ounces. Add to the previous mixture. This clears the solution when it is ready for use for local intensification. For tray intensification add more water to slow its action.

Intensifying with Red Ink (E. M. Cohen).—Soak the negative well. Put teaspoon of red ink into tray of water and rock until mixed. Immerse negatives face up till well and evenly colored, then without washing put in drying frame. If left in solution too long will be over dense, in which case several trays of clear water will eliminate some of the color.

The intensification is permanent without the danger of negative going bad, as is the case when mercury is used.

Intensifier—Mercuric Chloride Process.—No. 1. Mercuric chloride, 200 grains; bromide of potassium, 120 grains; water, 6½ ounces. No. 2. Sulphite of soda (anhydrous), 1 ounce; water, 4 ounces. The well-washed negative, free from hypo, must be thoroughly bleached in No. 1; well washed; and then blackened in No. 2. After blackening it is well washed again.

REDUCTION

Reducer, Single Solution (F. M. Steadman).—Red prussiate of potash, size of pea; hyposulphite of soda, six times that volume; water, 6 ounces (for local reduction, 1½ ounces.) When reduced wash thoroughly.

Reducer—Ammonium Persulphate.—Ammonium persulphate, 15 grains; water, 1 ounce. The solution should be made just before use. The negative must be perfectly free from hypo or it will be stained by the persulphate. When the desired reduction has been reached, transfer the negative without washing to a 10 per cent. solution of anhydrous sodium sulphite. Wash finally for 15 or 20 minutes.

Reducer—Farmer's.—Dissolve 1 ounce of potassium ferricyanide in 9 ounces of water and make up to 10 ounces, forming a 10 per cent. solution. Label this poison. Thoroughly wet the negative to be reduced. Take enough fresh plain hypo fixing bath for the purpose, and add to it enough of the ferricyanide solution to make it a light straw color. The negative to be reduced is immersed in this solution, when it will be seen to lose density. Rock the tray to insure evenness of action. This reducer can also be used for local treatment.

PRINTING PROCESSES

Blue Prints

Blue Printing Sensitizing Formulæ (Brown).—A. Dissolve 110 grains ferric ammonium citrate (green) in 1 ounce of water. B. Dissolve 40 grains of potassium ferricyanide in 1 ounce of water. These two solutions are made up separately. They are then mixed together and kept in a stoneware bottle, but the single solution should always be filtered before use. The mixture will retain its good qualities for months if kept from the light.

(Millen).—Potassium ferricyanide, 1 ounce; ammonio-citrate of iron, 1½ ounces; distilled water, 10 ounces. Mix thoroughly and filter. The solution should have a deep wine color and dry on the paper a lemon-yellow. If the solution is green and has a precipitate, the ammonio-citrate is old and spoiled. The mixture should be kept from the light.

Bromide Paper

Bromide Paper Developers: Hydroquinone-metol. No. 1. Water, 10 ounces; hydroquinone, 52 grains; potassium metabisulphite, 18 grains; sulphite of soda (anhydrous), 5 drams; carbonate of soda,

1¼ ounces. No. 2. Water, 10 ounces; metol, 30 grains; carbonate of soda, 5 drams; sulphite of soda (anhydrous), 5 drams. One or two drops of a potassium bromide 10 per cent. solution added to 1 ounce of the mixed developer will increase contrast and keep the whites pure. Equal parts of 1 and 2 give excellent prints from a normal negative; one part of 1 and two of 2 give gray prints with maximum half-tone and gradation; two parts of 1 and one of 2 give vigorous prints from soft delicate negatives.

Amidol for rich blacks (freshly prepared). Distilled (or boiled) water, 4 ounces; sulphite of soda (anhydrous), 45 grains; amidol, 10 to 15 grains. Add a drop of 10 per cent. bromide solution to each ounce of developer.

Sepia Tones: Hypo Alum.—Hyposulphite of soda, 5 ounces; ground alum, 1 ounce; boiling water, 70 ounces. Dissolve the hypo in the water, and then add the alum slowly. A milk-white solution results which should be decanted when clear. It is not used until cold (about 60° Fahr.).

Sepia Tones: Sulphide of Sodium.—The fixed and washed print is treated with one of the following solutions: (1) Potassium ferricyanide, 10 grains; potassium bromide, 10 grains; water, 1 ounce; or (2) potassium ferricyanide, 20 grains; sodium chloride (common salt), 30 grains; water, 1 ounce. The image will be bleached by either of these solutions in a few minutes, the whitish appearance of the deposit being caused by its change into a salt of silver. After 5 minutes in running water apply the sulphuretting solution: Dissolve 3 ounces of sodium monosulphide in 15 ounces of water; boil the solution for about 10 minutes, filter off the black precipitate formed, and when cooled make up to 25 ounces with water. To tone take of the sulphide solution 1 ounce and add water 12 to 20 ounces.

Red Tones: Copper.—Dissolve 100 grains of ammonium carbonate in 2 ounces of water, and in this solution dissolve 10 grains of sulphate of copper. Then add 20 grains of potassium ferricyanide. A clear, dark green solution results which gives a red-chalk tone in about 3 minutes. Tone until the deepest shadow is converted, and then wash the print for 10 minutes.

Green Tones: Vanadium.—Bleach print in the following: Potassium ferricyanide, 10 grains; ammonium carbonate, 100 grains; water, 1 ounce. Wash well and apply: Ferric chloride, 2 grains; vanadium chloride, 2 grains; ammonium chloride, 4 grains; hydrochloric acid, 5 minims; water, 1 ounce.

Blue Tones: Iron.—Bleach print in: Potassium ferricyanide, 10 grains; ammonium carbonate, 100 grains; water, 1 ounce; then tone in ferric chloride, 5 grains; hydrochloric acid, 5 minims; water, 1 ounce.

To prevent blistering on bromide paper (P. L. Anderson).—Immerse after fixing and before washing from 10 to 15 minutes in water, 10 ounces; formaldehyde, 1 ounce. A 10 per cent. solution of chrome alum will do equally well.

To make bromide paper translucent (P. L. Anderson).—Lay the paper negative face down on a blotter and paint thinly with the following mixture. Give three coats. Turpentine, 3 ounces; powered resin, 1 ounce; gum elemi, 1 ounce; paraffine wax, ½ ounce. Heat with stirring until it begins to boil. Allow to cool slightly and add turpentine, 3 ounces.

Carbon Tissue

Carbon Tissue, Sensitizer for (Bennett).—Potassium bichromate, 4 drams; citric acid, 1 dram; strong ammonia water, about 3 drams; water, 25 ounces; dissolve the bichromate and citric acid in hot water, and add sufficient ammonia to change the orange color of the solution to lemon-yellow. Sensitize for 90 seconds; reducing the water softens

the gradation in the print; increasing it to 30 ounces gives more vigor.

Carbon Lantern Slides.—Prepare the glass by coating with the following preparation: 180 grains of Nelson's Gelatine No. 1, in 20 ounces water. Add 10 grains bichromate of potash. Dry and allow the plate to be exposed to light for a couple of days to make the coating thoroughly insoluble. Sensitizer for tissue: 1 per cent. to 1¼ per cent. solution of bichromate of potash. Immerse 2 minutes. Print deeply; expose twice as long as ordinary paper print. Develop in hot water as usual.

Gum Bichromate

Gum Bichromate (Casper Millar). A.—Gum arabic, 1¼ ounces; water, 3½ ounces; salicylic acid, 4 grains.

B.—Chrome alum, 45 grains; water, 3½ ounces. Grind A and B with water and pigment, brush over paper, dry and store.

Suggested formula.—A. 2 ounces; B, 1½ drams; carbon black, 10 grains; sensitize for 2 minutes in 5 per cent. bichromate solution.

Kallitype

Kallitype Sensitizer for Black Tones (J. Thomson).—Distilled water, 1 ounce; ferric oxalate (Merck's or Mallinckrodt's), 15 grains; citrate of iron and ammonia (brown scales), 25 grains; chloride of copper, 8 grains; oxalate of potassium, 35 grains; oxalic acid, 15 grains; silver nitrate, 15 grains; gum arabic, 10 grains. For greater contrast add 1 to 10 drops 5 per cent. bichromate of potassium solution.

Developer: Stock Solution.—Distilled water, 1 ounce; silver nitrate, 40 grains; citric acid, 10 grains; oxalic acid, 10 grains. Filter. Normal developer 1 dram stock solution and 7 drams of water.

Platinum Papers

Platinum Sensitizer (P. L. Anderson).—Stock solutions: I. Water, hot, distilled, 2 ounces; ferric oxalate, 240 grains; oxalic acid, 16 grains. II. Water, hot, distilled, 2 ounces; ferric oxalate, 240 grains; oxalic acid, 16 grains; potassium chlorate, 4 grains. III. Water, distilled, 19 drams; potassium chloroplatinite, 219 grains (=½ ounce). Keep in amber glass bottles or in the dark. For use take: I, 22 mm.; II, 0 mm.; III, 24 mm. Gives very soft prints. Or, I, 12 mm.; II, 10 mm.; III, 24 mm. Results about the same contrast as a P. O. P. print. Or, I, 0 mm.; II, 22 mm.; III, 24 mm. Gives extreme contrast.

Above quantities sufficient for a 10 x 12 sheet of ordinary paper. Very smooth requires less and very rough more, up to 25 per cent. additional. Apply with a soft fitch or camel-hair brush, allow to surface dry, and make bone-dry over a stove or gas jet. Should dry in not less than five or more than ten minutes.

Platinum: Sensitizing Gold Bath and Sepia Papers. A.—Chloroplatinite of potassium, 15 grains; distilled water, 90 minims.

B.—Ferric oxalate, 21 grains; oxalic acid, 2 grains; distilled water, 183 minims. For cold bath paper, mix A and B, and add 15 minims of water. For sepia paper mix A and B and add 15 minims of a 5 per cent. solution of mercuric chloride. The addition of a few grains of potassium chlorate to any of the above gives increased contrast in the print. From 140 to 170 minims of solution are sufficient to coat a sheet of paper 20 x 26 inches.

Platinum Prints: to Intensify. A.—Sodium formate, 45 grains; water, 1 ounce.

B.—Platinum perchloride, 10 grains; water, 1 ounce.

C.—For use, take 15 minims each of A and B to 2 ounces of water. Immerse prints until sufficiently intensified, then remove and wash.

Platinum Prints to Distinguish from Bromide.—Soak the print in saturated solution of mercuric chloride; a platinum print will not change; a bromide print will bleach.

Salted Papers

Salted Paper Prints: Sensitized with the following: Silver, 480 grains Troy; water, 11 ounces. Dissolve and pour off 2 ounces, and to the 9 ounces left add strong aqua ammonia to form a precipitate and redissolve the precipitate, then add the remaining 2 ounces which will form another precipitate; to this add 9 drops of nitric acid C. P. Apply this to the paper with a tuft of cotton.

Any good toning bath will give good results, such as—Chloride aluminum, 80 grains; bi-carbonate soda, 360 grains; water, 48 ounces. When mixed this will form a flaky hydrate which will settle to the bottom. It can be strained through clean washed muslin. To prepare a small bath for toning, take 12 ounces of the stock solution and add sufficient gold to tone in 8 to 10 minutes. The gold solution must be neutralized with bi-carbonate soda before adding to the above bath. When the prints reach the desired tone throw them into a bath of salt water, made of water, 1 gallon; table salt, 1 ounce.

Printing Out Papers

Gold Toning (B. H. Allbee).—No. 1, 10 per cent. solution sulphocyanide of potassium; No. 2, 15 grains chloride of gold in 7½ ounces of water; No. 3, 10 per cent. solution phosphate of soda; No. 4, saturated solution borax. Take No. 1, 1 dram, water, 8 drams; No. 2, 4 drams; No. 3, 1 dram; No. 4, 2 drams. In this put print in dry. Toning should be complete in two minutes. Wash as usual.

Gold Toning.—For blue-black tones, for slight strengthening, and for converting rusty black into pure black. Soak prints in warm water, lay on warm glass, brush over glycerine and blot off. Pour on few minims of solution of gold chloride (1 grain per dram), and rapidly brush in all directions. When toned, rinse, and sponge back and front with: Metol, 50 grains; sodium sulphite, 1 ounce; potassium carbonate, ½ ounce; water, 20 ounces. Tone in daylight. Do not tone sepias or old prints in this solution.

Gold Toning—To Give Black Tones (A. B. Klugh).—Solution A. Sodium thiosulphate (hypo), 40 grams; water, 100 cc. Solution B. Lead nitrate, 5 grams; acetic acid, glacial, 5 cc.; water, 50 cc. Add to solution A enough of B to produce a slight milkiness. Filter and add 25 cc. of a 1% solution of gold chloride. Print deeply and tone until a warm black is produced.

MISCELLANÆ

Adhesive for Labels.—Soak 1 part of the best glue in water until thoroughly swollen, add a little sugar candy, 1 part of gum arabic and 6 parts of water. Boil with constant stirring over a spirit lamp until the whole gets thin. Coat sheets of paper with it; let dry and cut up into convenient sizes.

Autochromes.—Sensitizing to get more speed (M. G. Lovelace).—In complete darkness bathe plates in the following solution: Distilled water, 66 cc.; ethyl alcohol, pure, 90 deg., 33 cc.; dye solution, 2 cc.; ammonia, .30 cc. The dye solution is a mixture of pinachrome, pina verdol and pinacyanol, 1 part of each in 1000 of alcohol. Bathe plates for five minutes and dry away from dust. These plates require a special filter the formula being: Hard gelatine, 3 gms.; distilled water, 100 cc.; filter yellow K, 1 per cent. solution, 2.5 cc. Use 1 cc. to each 10 square centimeters of surface. These plates have about five times the speed and it is possible to make snap shots with them if a lens working at F/4.5 and F/5.6 is used.

Blackening Mixture.—Dissolve a 4-ounce stick of licorice in 8 ounces of water with the aid of gentle heat. When dissolved rub into the mixture 1 ounce of burnt sienna in powder, using the back of a spoon for this purpose. When cold, bottle for use.

Blackening Brass.—Make two solutions: Copper nitrate, 200 grains;

water, 1 ounce. Silver nitrate, 200 grains; water, 1 ounce. Mix the solutions; clean the article well; dip it in the solution for a moment; withdraw it; dry it; and heat it strongly.

Black, Dead, for Wood.—Shellac, 40 parts; borax, 20 parts; glycerine, 20 parts; water, 500 parts. When dissolved, add 50 parts aniline black.

Cleaning Greasy Bottles.—Wash with benzine, or permanganate of potassium, to which has been added some hydrochloric acid.

Bottles that have contained resinous substances, wash with potash or soda and rinse with alcohol. Bottles that have contained essences, wash with sulphuric acid, then with water.

Clearing Stained Negatives.—Dissolve ¼ ounce of pulverized alum in 20 ounces of water and add 1 dram of sulphuric acid. Immerse the stained plate in this solution for a few minutes; remove plate, wash and then set in the rack to dry.

Film: to Remove from Glass: Make two solutions. A.—Sodium flouride, 6 grains; water, 4 ounces.

B.—Sulphuric acid, 6 drops; water, 1 ounce. Place the negative in solution A for 2 minutes and then place directly in solution B. After another 2 minutes lift the film with the finger from one corner of the plate. It will soon leave the glass.

Firelight Effects on Developing Paper (H. S. Hood). No. 1.—Water, 5 drams; copper sulphate, 10 per cent. solution, 15 minims; ammonium carbonate, 10 per cent. solution. Add till precipitate first formed is redissolved.

No. 2.—Water, 4½ ounces; potassium ferricyanide, 6/10 drams. Mix separately and add No. 2 to No. 1. The print will turn bright red Wash well.

Ground Glass: Substitutes for. 1.—Paraffine wax makes an excellent substitute for ground glass if the latter should get broken. Iron the paper onto a sheet of plain glass. It is more transparent than the focusing screen and the image will appear clearer; hence, in exposing allowance must be made for the difference in illumination.

2.—Resin dissolved in wood alcohol and blown over the glass; this must not be scratched; it gives a very fine-grained ground glass effect.

3.—White wax, 120 grains; ether, 1 ounce.

Ground Glass Varnish: Sandarac, 90 grains; mastic, 20 grains; ether, 2 ounces. Dissolve the resins in the ether and add benzole ½ to 1½ ounces.

Lens: to Clean.—The lens should always be kept free from dust or other impurities. To clean it, spread upon a table a clean sheet of paper; take the lens apart, and with a camel-hair brush dust each of the combinations on both sides. If the surfaces of the lenses are very dirty and have lost their polish, make up the following: Nitric acid, 3 drops; alcohol, 1 ounce; distilled water, 2 ounces. Dip a tuft of filtering cotton in this solution, rub each side of the lens, then polish with an absolutely clean chamois. Clean the lens tube before replacing the lenses, each of which should be finally dusted with a camel-hair brush.

Moonlight Effects on Developing Paper (H. S. Hood).—Immerse in water, 5 ounces; ferric ammonium citrate, 12 grains; potassium ferricyanide, 12 grains; nitric acid, 2/5 drams. Prints will assume a blue color. Wash until whites become clear.

Mounting Without Cockling (W. S. Davis).—Coat back of dry print with as strong a solution of warm gelatine (pure table gelatine will do) as can be spread easily. Allow to dry, then attach to mount by dampening the amount with water, then lay print in desired position; cover with a sheet of bond or smooth paper, and apply a warm flat iron until the gelatine melts. Very effective for thin mounting material, as there is no cockling if the mount contains just the right amount of water.

Paste, Starch (A. Lomax).—Powdered starch, 1 ounce; cold water, 12 ounces. Mix smooth with a glass rod, heat to boiling point. Boil half a minute stirring all the time. Use cold.

Poisons and Antidotes.—Administer the antidote as soon as possible. If a strong acid or alkali, or cyanide of potassium, has been swallowed, lukewarm water in large quantities should be swallowed at once. Where strong acids or alkalies have not been swallowed, rid the stomach of the poison by vomiting; for this purpose take 25 grains of zinc sulphate in warm water.

Polished surfaces: to Photograph.—*Smear* the surface with soft putty so as to deaden the reflections. Photograph the article against a black background. and stop off all reflections, allowing the light to come from one direction only. To photograph hollow cut glassware fill with ink or aniline black water dye. Before photographing machinery deaden the bright parts with putty.

Safe Light for Panchromatic Plates.—Take old dry plates and coat with the following: Water, 10 ounces, tartrazine, 75 grains; patent blue A, 75 grains; naphthol greens, 75 grains; sulphuric acid, 30 minims. Stain the plates as deeply as possible. Use two plates.

Stains: to Remove from the Hands.—Developer stains: solution of citric or oxalic acid. Silver nitrate stains: Water, 4 ounces; chloride of lime, 350 grains; sulphate of soda, 1 ounce. Apply with a brush.

Tarnished Daguerreotypes, to Restore.—Remove the silvered plate from the case and place it, image uppermost, under a box lid or other protector from dust, etc. Put a small piece of potassium cyanide into a graduate and pour over it 1 or 2 ounces of water. Hold the daguerreotype by the corner with a pair of pliers, rinse it in clear running water, then pour over it the weak cyanide solution (a .3 per cent. solution is usually employed), and return it to the graduate. Repeat this operation several times until the discoloration quite disappears. Wash well in running water, and then, before the surplus water has time to collect in tears upon the image, begin to dry the plate gradually over a spirit lamp, holding the plate in an inclined position so that it will dry from the uppermost corner. The secret of success is in the use of pure water for the final washings and the drying of the image without check or the formation of tears.

Test for Hypo: Potassium permanganate, 2 grains; potassium carbonate, 20 grains; distilled water, 40 ounces. Soak the plate or print to be treated in water for one hour, then remove and add to the water a few drops of the above solution, which will turn a greenish yellow or brown if the water is not free from hypo.

To Flatten Double-weight Prints (George D. Jopson).—A—9 ounces boiling water; ½ ounce gelatine. B—3 ounces boiling water; ½ drachm alum. C—2 drachms oil of cloves. Mix and strain through cheese cloth while hot. To use take a little from the stock and place in a cup. Place cup in hot water until backing is dissolved. Apply very thin to back of print with soft cloth or a tuft of cotton.

COMPARISON OF VALUES
COMPILED BY CHAS. LE B. GOELLER

Taking for a standard f.8 as unit of measurement.
Speed increased. Opening twice as fast.

f:8	= 1	Twice as fast	as	f:11.3	exposure	1 sec.
7.5	= 1⅛	"	as	10.6	"	0.88 sec.
6.8	= 1⅜	"	as	9.6	"	0.725 "
6.3	= 1 3/5	"	as	8.8	"	0.625 "
6.	= 1 7/9	"	as	8.5	"	0.5625 "
5.6	= 2.	"	as	8	"	0.5 "
4.5	= 3 1/6	"	as	6.3	"	0.3125 "

UNITED STATES WEIGHTS AND MEASURES

According to Existing Standards

LINEAR

	Inches	Feet	Yards	Rods	Fur's	Mi.
12 inches = 1 foot.	12 =	1				
3 feet = 1 yard.	36 =	3 =	1			
5.5 yards = 1 rod.	198 =	16.5 =	5.5 =	1		
40 rods = 1 furlong.	7,920 =	660 =	220 =	40 =	1	
8 furlongs = 1 mile.	63,360 =	5,280 =	1,760 =	320 =	8 =	1

SURFACE—LAND

	Feet	Yards	Rods	Roods	Acres
144 sq. ins. = 1 sq. ft.					
9 sq. ft. = 1 sq. yd.	9 =	1			
30.25 sq. yds. = 1 sq. rod.	272.25 =	30.25 =	1		
40 sq. rods = 1 sq. rood.	10,890 =	1,210 =	40 =	1	
4 sq. roods = 1 acre.	43,560 =	4,840 =	160 =	4 =	1
640 acres = 1 sq. mile.	27,878,400 =	3,097,600 =	102,400 =	2,560 =	640

VOLUME—LIQUID

	Gills	Pints	Gallon	Cub. In.
4 gills = 1 pint.				
2 pints = 1 quart.	32 =	8 =	1 =	231
4 quarts = 1 gallon.				

FLUID

Gallon	Pints	Ounces	Drachms	Minims	Cubic Centimetres
1 =	8 =	128 =	1,024 =	61,440 =	3,785,435
	1 =	16 =	128 =	7,680 =	473,179
		1 =	8 =	480 =	29,574
			1 =	60 =	3,697

16 ounces, or a pint, is sometimes called a fluid pound.

TROY WEIGHT

Pound	Ounces	Pennyweights	Grains	Grams
1 =	12 =	240 =	5,760 =	373.24
	1 =	20 =	480 =	31.10
		1 =	24 =	1.56

APOTHECARIES' WEIGHT

lb. Pound	℥ Ounces	ʒ Drachms	℈ Scruples	gr. Grains	Grams
1 =	12 =	96 =	288 =	5,760 =	373.24
	1 =	8 =	24 =	480 =	31.10
		1 =	3 =	60 =	3.89
			1 =	20 =	1.30
				1 =	.C6

The pound, ounce, and grain are the same as in Troy weight.

AVOIRDUPOIS WEIGHT

Pound	Ounces	Drachms	Grains (Troy)	Grams
1 =	16 =	256 =	7,000 =	453.60
	1 =	16 =	437.5 =	28.35
		1 =	27.34 =	1.77

ENGLISH WEIGHTS AND MEASURES

APOTHECARIES' WEIGHT

20 Grains	=	1 Scruple	=	20 Grains.
3 Scruples	=	1 Drachm	=	60 Grains.
8 Drachms	=	1 Ounce	=	480 Grains.
12 Ounces	=	1 Pound	=	5,760 Grains.

FLUID MEASURE

60 Minims	=	1 Fluid Drachm
8 Drachms	=	1 Fluid Ounce
20 Ounces	=	1 Pint
8 Pints	=	1 Gallon

The above weights are usually adopted in formulas.

All Chemicals are usually sold by

AVOIRDUPOIS WEIGHT

$27^{11}/_{32}$	Grains	=	1 Drachm	=	$27^{11}/_{32}$	Grains
16	Drachms	=	1 Ounce	=	437½	Grains
16	Ounces	=	1 Pound	=	7,000	Grains

Precious Metals are usually sold by

TROY WEIGHT

24 Grains	=	1 Pennyweight	=	24 Grains
20 Pennyweights	=	1 Ounce	=	480 Grains
12 Ounces	=	1 Pound	=	5,760 Grains

NOTE.—An ounce of metallic silver contains 480 grains, but an ounc of nitrate of silver contains only 437½ grains.

UNITED STATES FLUID MEASURE

Gal.	Pints.	Ounces.	Drachms.	Mins.	Cub. In.	Grains.	Cub. C.M.
1 =	8 =	128 =	1,024 =	61,440 =	231. =	58,328.886 =	3,785.44
	1 =	16 =	128 =	7,680 =	28.875 =	7,291.1107 =	473.18
		1 =	8 =	480 =	1.8047 =	455.6944 =	29.57
			1 =	60 =	0.2256 =	56.9618 =	3.70

IMPERIAL BRITISH FLUID MEASURE

Gal.	Pints.	Ounces.	Drachms.	Mins.	Cub. In.	Grains.	Cub. C.M.
1 =	8 =	160 =	1,280 =	76,800 =	277.27384 =	70,000 =	4,543.732
	1 =	20 =	160 =	9,600 =	34.65923 =	8,750 =	567.966
		1 =	8 =	480 =	1.73296 =	437.5 =	28.398
			1 =	60 =	0.21662 =	54.69 =	3.550

METRIC SYSTEM OF WEIGHTS AND MEASURES

MEASURES OF LENGTH

Denominations and Values		Equivalents in Use	
Myriameter	10,000 meters.	6.2137	miles.
Kilometer	1,000 meters.	.62137	mile, or 3,280 ft. 10 ins.
Hectometer	100 meters.	328.	feet and 1 inch.
Dekameter	10 meters.	393.7	inches.
Meter	1 meter.	39.37	inches.
Decimeter	1-10th of a meter.	3.937	inches.
Centimeter	1-100th of a meter.	.3937	inch.
Millimeter	1-1000th of a meter.	.0394	inch.

MEASURES OF SURFACE

Denominations and Values		Equivalents in Use	
Hectare	10,000 square meters.	2.471	acres.
Are	100 square meters.	119.6	square yards.
Centare	1 square meter.	1,550.	square inches

MEASURES OF VOLUME

Denominations and Values			Equivalents in Use			
Names	No. of Liters	Cubic Measures	Dry Measure		Wine Measure	
Kiloliter or stere	1,000	1 cubic meter.	1.308	cubic yards.	264.17	gallons.
Hectoliter	100	1-10th cubic meter.	2	bu. and 3.35 pecks.	26.417	gallons.
Dekaliter	10	10 cubic decimeters.	9.08	quarts.	2.6417	gallons.
Liter	1	1 cubic decimeter.	.908	quart.	1.0567	quarts.
Deciliter	1–10	1-10th cubic decimeter.	6.1023	cubic inches.	.845	gill.
Centiliter	1–100	10 cubic centimeters	.6102	cubic inch.	.338	fluid oz.
Milliliter	1–1000	1 cubic centimeter.	.061	cubic inch.	.27	fl. drm.

WEIGHTS

Denominations and Values			Equivalents in Use	
Names	Number of Grams	Weight of Volume of Water at its Maximum Density	Avoirdupois Weight	
Millier or Tonneau	1,000,000	1 cubic meter.	2204.6	pounds.
Quintal	100,000	1 hectoliter.	220.46	pounds.
Myriagram	10,000	10 liters.	22.046	pounds.
Kilogram or Kilo	1,000	1 liter.	2.2046	pounds.
Hectogram	100	1 deciliter.	3.5274	ounces.
Dekagram	10	10 cubic centimeters.	.3527	ounce.
Gram	1	1 cubic centimeter.	15.432	grains.
Decigram	1–10	1-10th of a cubic centimeter.	1.5432	grain.
Centigram	1–100	10 cubic millimeters.	.1543	grain.
Milligram	1–1000	1 cubic millimeter.	.0154	grain.

For measuring surfaces, the square dekameter is used under the term of ARE; the hectare, or 100 ares, is equal to about 2½ acres. *The unit of capacity* is the cubic decimeter or LITER, and the series of measures is formed in the same way as in the case of the table of lengths. The cubic meter is the unit of measure for solid bodies, and is termed STERE. *The unit of weight* is the GRAM, which is the weight of one cubic centimeter of pure water weighed in a vacuum at the temperature of 4 deg. Cent. or 39.2 deg. Fahr., which is about its temperature of maximum density. In practice, the term cubic centimeter, abbreviated c.c., is generally used instead of milliliter and cubic meter instead of kiloliter.

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH MEASURE

1 cubic centimeter	=	17 minims									
2 cubic centimeters	=	34	"								
3	"	=	51	"							
4	"	=	68	"	or	1 dram	8 minims				
5	"	=	85	"	"	1 "	25 "				
6	"	=	101	"	"	1 "	41 "				
7	"	=	118	"	"	1 "	58 "				
8	"	=	135	"	"	2 drams	15 "				
9	"	=	152	"	"	2 "	32 "				
10	"	=	169	"	"	2 "	49 "				
20	"	=	338	"	"	5 "	38 "				
30	"	=	507	"	"	1 ounce	0 dram	27 minims			
40	"	=	676	"	"	1 "	3 drams	16 "			
50	"	=	845	"	"	1 "	6 "	5 "			
60	"	=	1014	"	"	2 ounces	0 "	54 "			
70	"	=	1183	"	"	2 "	3 "	43 "			
80	"	=	1352	"	"	2 "	6 "	32 "			
90	"	=	1521	"	"	3 "	1 "	21 "			
100	"	=	1690	"	"	3 "	4 "	10 "			
1000	"	=	1 liter =			35 "	1 "	40 "			

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH WEIGHT

The following table, which contains no error greater than one-tenth of a grain, will suffice for most practical purposes.

1 gram	=	15 2/5 grains.					
2 grams	=	30 4/5	"				
3 "	=	46 1/5	"				
4 "	=	61 4/5	"	....................or	1 dram	1 4/5 grain	
5 "	=	77 1/5	"	...................."	1 "	17 1/5 grains	
6 "	=	92 3/5	"	...................."	1 "	32 3/5	"
7 "	=	108	"	...................."	1 "	48	"
8 "	=	123 2/5	"	...................."	2 drams	3 2/5	"
9 "	=	138 4/5	"	...................."	2 "	18 4/5	"
10 "	=	154 2/5	"	...................."	2 "	34 2/5	"
11 "	=	169 4/5	"	...................."	2 "	49 4/5	"
12 "	=	185 1/5	"	...................."	3 "	5 1/5	"
13 "	=	200 3/5	"	...................."	3 "	20 3/5	"
14 "	=	216	"	...................."	3 "	36	"
15 "	=	231 2/5	"	...................."	3 "	51 2/5	"
16 "	=	247	"	...................."	4 "	7	"
17 "	=	262 2/5	"	...................."	4 "	22 2/5	"
18 "	=	277 4/5	"	...................."	4 "	37 4/5	"
19 "	=	293 1/5	"	...................."	4 "	53 1/5	"
20 "	=	308 3/5	"	...................."	5 "	8 3/5	"
30 "	=	463	"	...................."	7 "	43	"
40 "	=	617 1/5	"	...................."	10 "	17 1/5	"
50 "	=	771 3/5	"	...................."	12 "	51 3/5	"
60 "	=	926	"	...................."	15 "	26	"
70 "	=	1080 1/5	"	...................."	18 "	0 1/5	"
80 "	=	1234 3/5	"	...................."	20 "	34 3/5	"
90 "	=	1389	"	...................."	23 "	9	"
100 "	=	1543 1/5	"	...................."	25 "	43 1/5	"
1000 "	=	1 kilogram = 32 oz., 1 dr., 12 2/5 gr.					

THE ELEMENTS:

THEIR NAMES, SYMBOLS, AND ATOMIC WEIGHTS OXYGEN STANDARD.

Compiled by HENRY F. RAESS.

1915

Aluminum	Al	27.10	Holmium	Ho	163.50	Rhodium	Rh	102.90
Antimony	Sb	120.20	Hydrogen	H	1.008	Rubidium	Rb	85.45
Argon	A	39.88	Indium	In	114.80	Ruthenium	Ru	101.70
Arsenic	As	74.96	Iodine	I	126.92	Samarium	Sa	150.40
Barium	Ba	137.37	Iridium	Ir	193.10	Scandium	Sc	44.10
Bismuth	Bi	208.00	Iron	Fe	55.84	Selenium	Se	79.20
Boron	B	11.00	Krypton	Kr	82.92	Silicon	Si	28.30
Bromine	Br	79.92	Lanthanum	La	139.00	Silver	Ag	107.88
Cadmium	Cd	112.40	Lead	Pb	207.10	Sodium	Na	23.00
Caesium	Cs	132.81	Lithium	Li	6.94	Strontium	Sr	87.63
Calcium	Ca	40.07	Lutecium	Lu	174.00	Sulphur	S	32.07
Carbon	C	12.00	Magnesium	Mg	24.32	Tantalum	Ta	181.50
Cerium	Ce	140.25	Manganese	Mn	54.93	Tellurium	Te	127.50
Chlorine	Cl	35.46	Mercury	Hg	200.60	Terbium	Tb	159.20
Chromium	Cr	52.00	Molybdenum	Mo	96.00	Thallium	Tl	204.00
Cobalt	Co	58.97	Neodymium	Nd	144.30	Thorium	Th	232.40
Columbium	Cb	93.50	Neon	Ne	20.20	Thulium	Tm	168.50
Copper	Cu	63.57	Nickel	Ni	58.68	Tin	Sn	119.00
Dysprosium	Dy	162.50	Niton	Nt	222.40	Titanium	Ti	48.10
Erbium	Er	167.70	Nitrogen	N	14.01	Tungsten	W	184.00
Europium	Eu	152.00	Osmium	Os	190.90	Uranium	U	238.50
Fluorine	F	19.00	Oxygen	O	16.00	Vanadium	V	51.00
Gadolinium	Gd	157.30	Palladium	Pd	106.70	Xenon	Xe	130.20
Gallium	Ga	69.90	Phosphorus	P	31.04	Ytterbium	Yb	173.50
Germanium	Ge	72.50	Platinum	Pt	195.20	Yttrium	Yt	89.00
Glucinum	Gl	9.10	Potassium	K	39.10	Zinc	Zn	65.37
Gold	Au	197.20	Praseodymium	Pr	140.60	Zirconium	Zr	90.60
Helium	He	3.96	Radium	Ra	226.40			

TABLE OF COMPARATIVE PLATE SPEED NUMBERS

H & D	Watkins P No.	Wynne F No.	H & D	Watkins P No.	Wynne F No.
10	15	24	220	323	114
20	30	35	240	352	120
40	60	49	260	382	124
80	120	69	280	412	129
100	147	77	300	441	134
120	176	84	320	470	138
140	206	91	340	500	142
160	235	98	380	558	150
200	294	109	400	588	154

The above Watkins and Wynne numbers are equivalent to the H and D, only when the latter is determined in accordance with the directions of Hurter and Driffield, that is with pyro-soda developer and using the straight portion only of the density curve.

To convert H and D into Watkins: Multiply H and D by 50 and divide by 34. For all practical purposes the Watkins P number is 1½ times H and D.

To convert Watkins into Wynne F Nos.: Extract the square root and multiply by 6.4.

The above methods have been approved by the Watkins Meter Company and the Infallible Exposure Meter Company.

THERMO DEVELOPMENT

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TABLE OF TEMPERATURES

Degrees Fahrt.	Min. Tray T.C.1.9.	Min. Tank T.C.1.9.	Min. Tray T.C.2.6	Min. Tank T.C.2.6
80	3¼	12	1¾	7¾
78	3½	13	2	8½
76	3¾	14	2¼	9½
74	4	15	2½	10¾
72	4¼	16	2¾	11¾
70	4½	17	3	13
68	5	18¼	3¼	14½
66	5¼	19½	3¾	16
64	5¾	21	4	18
62	6¼	22½	4½	20
60	6½	24	5	22
58	7	26	5½	24½
56	7½	28	6	27
54	8	30	6½	30
52	8½	32	7½	33
50	9¼	34	8½	37
48	10	37	9½	41½
46	10¾	40	10½	46
44	11½	43	11½	51½
42	12¼	46	12¾	57
40	13¼	49	14½	63

TABLE OF DEVELOPMENT SPEEDS

ANSCO FILM, MS. BARNET—Super-speed Ortho, M; Extra Rapid Ortho, MS. Red Seal, M; Red Diamond, MS; Self-screen Ortho, MS; CENTRAL—Special XX., S; Special, M; Comet, M; Colornon, MQ; Panortho, MQ; CRAMER—Crown S; Anchor, MQ; Banner X, S; Inst. Iso., MQ; Med. Iso. MQ; Commercial Isonon, MQ; Portrait Isonon, M; Trichromatic, MQ; Spectrum, MQ; Slow Iso, MQ; Contrast, VVQ. ENSIGN FILM, MS. HAMMER—Special Extra Fast, MS; Extra Fast, M; Aurora Extra Fast, MS; Ortho Extra Fast, M; Ortho Nonhal., M; Fast, MQ; Slow, VQ. Ortho Slow, VQ. ILFORD—Monarch, VS; Zenith, VS; Special Rapid, VS; Rapid Chromatic, M; Ordinary, Q. IMPERIAL—Flash Light, M; Special Sensitive, MQ; Orthochrome S.S., MQ; Special Rapid, S; Orthochrome S.R., MS; Non-filter, MQ. KODAK—Speed Film, S; N.C. Film, S; Portrait Film, S. MARION—Record, S; P.S.; MS. PAGET—XXX M; XXXXX, MS; Swift., S; Ex. Spec. Rap., S; Ortho. Ex. Spec. Rap., MQ; Panchro Ord., Q; Panchro. Color, VQ; Spec. Rap., S; Hydra Panchro., MQ; Hydra Rapid, MQ. PREMO FILM PACK—S. SEED—Graflex, S; 30 Gilt Edge, MS; 26 X, MS; 23, MQ; L Ortho, MQ; Non-halation, MQ; Panchromatic, VQ. STANDARD—Extra, Orthonon, MQ; Polychrome, MQ. STANLEY—50, M; Commercial, MQ. WELLINGTON—Extreme, S; 'Xtra Speedy, MS; Film, MS; Iso Speedy, M; Portrait Speedy, M; Anti-Screen, M; Speedy Spec. Rap., M; Ortho Process, M; Wratten—Panchro, MQ; Process Panchro, Q.

WATKINS THERMO PYRO-SODA T. C. 1.9

a.	Potassium metabisulphite	80 gr.
	Pyro	160 gr.
	Sodium sulphite, dry	1 oz.
	Water to make	10 oz.
b.	Sodium carbonate, dry	2 oz.
	Potassium bromide	40 gr.
	Water to make	10 oz.

MODIFIED THERMO M. Q. T. C. 1.9

a.	Potassium metabisulphite	60 gr.
	Metol	30 gr.
	Hydrochinon	90 gr.
	Water to make	20 oz.
b.	Sodium sulphite, dry	1 oz.
	Sodium carbonate, dry	1½ oz.
	Water to make	20 oz.

MODIFIED THERMO D. Q. T. C. 2.6

a.	Potassium metabisulphite	60 gr
	Duratol	30 gr.
	Hydrochinon	90 gr.
	Water to make	20 oz.
b.	Sodium sulphite, dry	1½ oz.
	Sodium carbonate, dry	2 oz.
	Water to make	20 oz.

INSTRUCTIONS.—Look up the Development Speed of the plate or film and mix the developer as directed for that class, USING WATER WHICH HAS STOOD IN THE ROOM LONG ENOUGH TO ATTAIN ROOM TEMPERATURE. In safe ruby light (or total darkness) place the plate in the tray, flow it with developer, cover the tray light-tight, and note the time. We recommend handling plates in total darkness and using white light while they are covered. Now observe the temperature of the room and consult the Table of Temperatures, where the correct time for development will be found opposite the degree and under the Temperature-Coefficient of the developer in use. The tray may be rocked now and then during development, but the plate should not be removed from the solution until the time is up. Then turn out the white light and rinse and fix the plate by safe light or in a covered tank.

If the first trial does not give the right printing quality to suit your requirements, classify the plate one class nearer VS for more or one class farther from VS for less contrast.

DILUTION OF DEVELOPER.—	VVQ	VQ	Q	MQ	M	MS	S	VS
Watkins Thermo Pyro-Soda....	1	1⅓	1¾	2¼	3	4	5	6¾
Modified Thermo M.-Q....... } Modified Thermo Duratol..... }	1½	2	2⅔	3½	4½	6	8	10

drams of each stock to be diluted to make total volume 3 ounces for tray or 10 ounces for tank development.

Rodinal (Citol, Azol, Certinal)..	20	26	35	45	60	80	105	135

minims solution to be made up to 3 ounces for tray or 9 ounces for tank. T. C. 1.9.

Dilution of Dev.	V VQ	V Q	Q	M Q	M	M S	S	V S
Metabisulphite grs. Potass......	1.68	*2¼	3.	4.	5.	6.8	9.	12.
Metol........	.84 } or 1.68	1⅛ } or 2¼	1½ } or 3	2. } or 4	2½ } or 5	3.4 } 6.8	4½ } or 9	6 } 12
Hydrochinon..	2.52 } 1.68	3⅜ } 2¼	4½ } 3	6. } 4	7½ } 5	10.2 } 6.8	13½ } 9	18 } 12
Sod. Sulphite..	12.5	16⅔	22.	28.	37.	50.	66.	82.
Sod. Carbonate	18.75	24¾	33.	42.	55.	70.	99.	123.
Water........	30 ʒ	30 ʒ	30 ʒ	30 ʒ	30 ʒ	30 ʒ	30 ʒ	30 ʒ

*For flashlight pictures equal parts of Hydrochinon and Eikonogen give softer effects.

N.B.—A single portion of developer should be used for only one plate, but the used developer (except pyro) should be saved for paper. If fog occurs, add to each ounce of water used for diluting, 7½ to 10 grs. dry sulphite.

May L. Smith.

TABLE FOR CALCULATING DISTANCES IN ENLARGING OR REDUCING

From The British Journal Photographic Almanac

Focus of Lens	Times of Enlargement and Reduction							
Inches	1 Inch	2 Inches	3 Inches	4 Inches	5 Inches	6 Inches	7 Inches	8 Inches
2..........	4 4	6 3	8 2 2/3	10 2 1/2	12 2 2/5	14 2 1/3	16 2 2/7	18 2 1/4
2 1/2........	5 5	7 1/2 3 3/4	10 3 1/3	12 1/2 3 1/8	15 3	17 1/2 2 9/10	20 2 6/7	22 1/2 2 13/16
3..........	6 6	9 4 1/2	12 4	15 3 3/4	18 3 3/5	21 3 1/2	24 3 3/7	27 3 3/8
3 1/2........	7 7	10 1/2 5 1/4	14 4 2/3	17 1/2 4 3/4	21 4 1/5	24 1/2 4 1/12	28 4	31 1/2 3 9/10
4..........	8 8	12 6	16 5 1/3	20 5	24 4 4/5	28 4 2/3	32 4 4/7	36 4 1/2
4 1/2........	9 9	13 1/2 6 3/4	18 6	22 1/2 5 3/5	27 5 2/5	31 1/2 5 1/4	36 5 1/7	40 1/2 5 1/16
5..........	10 10	15 7 1/2	20 6 2/3	25 6 1/4	30 6	35 5 5/6	40 5 5/7	45 5 5/8
5 1/2........	11 11	16 1/2 8 1/4	22 7 1/3	27 1/2 6 4/5	33 6 1/2	38 1/2 6 5/12	44 6 2/7	49 1/2 6 3/16
6..........	12 12	18 9	24 8	30 7 1/2	36 7 1/5	42 7	48 6 6/7	54 6 3/4
7..........	14 14	21 10 1/2	28 9 1/3	35 8 3/4	42 8 2/5	49 8 1/6	56 8	63 7 7/8
8..........	16 16	24 12	32 10 2/3	40 10	48 9 3/5	56 9 1/3	64 9 1/7	72 9
9..........	18 18	27 13 1/2	36 12	45 11 1/4	54 10 4/5	63 10 1/2	72 10 2/7	81 10 1/8

The object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical center. The use of the table will be seen from the following illustration: A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of 6 inches equivalent focus. He must therefore look for 4 on the upper horizontal line and for 6 on the first vertical column and carry his eye to where these two join, which will be 30-7 1/2. The greater of these is the distance the sensitive plate must be from the center of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times, the same method must be followed; but in this case the greater number will represent the distance between the lens and the picture to be copied, the latter that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be 12 inches, as this number is not in the column of focal lengths, look out for 6 in this column and multiply by 2, and so on with any other numbers.

TABLES OF DISTANCES AT AND BEYOND WHICH ALL OBJECTS ARE IN FOCUS WHEN SHARP FOCUS IS SECURED ON INFINITY

Focal Length of Lens in Inches	Ratio marked on Stops													
	f/4	f/5.6	f/6	f/7	f/8	f/10	f/11	f/15	f/16	f/20	f/22	f/32	f/44	f/64
	Number of feet after which all is in focus													
4	33	24	22	19	17	13	12	9	8	7	6	4	3	2
4¼	38	27	25	21	19	15	14	10	10	7	7	5	3½	2½
4½	42	30	28	24	21	17	15	11	11	8½	7½	5½	4	3
4¾	47	34	31	27	24	19	17	12	12	9½	8½	6	5	3
5	52	36	35	30	26	21	19	14	13	10½	9½	6½	5½	3¼
5¼	57	40	38	33	28	23	21	15	14	11½	10½	7	5½	3½
5½	63	45	43	36	31	25	23	17	15	12½	11½	7½	6	4
5¾	68	50	46	38	34	27	25	18	17	13½	13	8½	6½	4
6	75	54	50	42	38	30	28	20	19	15	14	9	7	4½
6¼	81	58	54	46	40	32	29	22	20	16	15	10	7½	5
6½	87	62	58	50	44	35	32	23	22	17½	16	11	8	5½
6¾	94	67	63	54	47	38	34	25	24	19	17	12	8½	6
7	101	72	68	58	51	40	37	27	25	20	18	12½	9	6
7¼	109	78	73	62	54	44	39	29	27	22	20	13½	10	6½
7½	117	83	78	64	58	47	42	31	29	24	21	14½	10½	7
7¾	124	90	83	71	62	50	45	33	31	25	22	15½	11	7½
8	132	96	88	76	68	52	48	36	32	28	24	16	12	8
8¼	141	100	94	80	71	56	51	37	35	29	25	17½	12½	8½
8½	150	104	100	84	76	60	56	40	38	30	27	19	13½	9
8¾	156	111	104	89	78	63	57	42	39	32	29	20	14	10
9	168	120	112	96	84	67	61	45	42	34	31	21	15	10½
9¼	180	127	116	101	90	71	65	47	45	35	32	22	16	11
9½	190	133	125	107	95	75	68	50	47	37	34	24	17	12
9¾	197	141	131	113	99	79	72	52	50	39	36	25	18	12½
10	208	148	140	120	104	83	75	55	52	42	38	26	19	13

If sharp focus is secured on any of the distances shown, then with the stop indicated all objects are in focus from half the distance focused on up to infinity.

LENGTH OF STUDIO

REQUIRED FOR LENSES OF DIFFERENT FOCAL LENGTHS FROM 6 TO 8 FEET IS ALLOWED FOR THE CAMERA AND OPERATOR

From "Photographic Lenses" by BECK and ANDREWS

Focus of Lens	Size	Kind of Portrait	Length of Studio	Dist. of Lens from Object
Inches			In Feet	In Feet
6	Carte de Visite 3¼x4¼..........	Full Length	18 to 20	11 to 12
7½	Carte de Visite.................	Full Length	22 to 25	14 to 15
8½	Carte de Visite.................	Full Length	24 to 28	17 to 19
		Bust	10 to 15	5
9½	Cabinet and smaller groups.......	Full Length	20 to 23	12 to 13
		Bust	12 to 17	7
11	Cabinet and 5x7 groups..........	Full Length	25 to 30	17 to 18
		Bust	13 to 20	8
14½	Cabinets, panels and 6½x8½ groups......................	Full Length	32 to 40	23 to 24
		Bust	14 to 20	7
19	10x12 portraits or groups........	Full Length	20 to 25	13
		Bust	14 to 20	7
24	16x20 portraits or groups........	Full Length	25 to 30	14
		Bust	14 to 20	8

"UNIFORM SYSTEM" NUMBERS FOR STOPS FROM $\frac{f}{1}$ TO $\frac{f}{100}$

In the following table Mr. S. A. Warburton calculated the exposure necessary with every stop from $\frac{f}{1}$ to $\frac{f}{100}$ compared with the unit stop of the "uniform system" of the Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from $\frac{f}{4}$, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.	*f*	U. S. No.	*f*	U. S. No.
1	1/16	15	14.06	58	210.25
1¼	.097	16	16	59	217.56
1.414	⅛	17	18.06	60	225.00
1½	.140	18	20.25	61	232.56
1¾	.191	19	22.56	62	240.25
2	¼	20	25.00	63	248.06
2¼	.316	21	27.56	64	256
2½	.390	22	30.25	65	264.06
2.828	½	22.62	32	66	272.25
2¾	.472	23	33.06	67	280.56
3	.562	24	36.00	68	289.00
3¼	.660	25	39.06	69	297.56
3½	.765	26	42.25	70	306.25
3¾	.878	27	45.56	71	315.06
4	1	28	49.00	72	324.00
4¼	1.12	29	52.56	73	333.06
4½	1.26	30	56.25	74	342.25
4¾	1.41	31	60.06	75	351.56
5	1.56	32	64	76	361.00
5¼	1.72	33	68.06	77	370.56
5½	1.89	34	72.25	78	380.25
5.656	2	35	76.56	79	390.06
5¾	2.06	36	81.00	80	400.00
6	2.25	37	85.56	81	410.06
6¼	2.44	38	90.25	82	420.25
6½	2.64	39	95.06	83	430.56
6¾	2.84	40	100.00	84	440.00
7	3.06	41	105.06	85	451.56
7¼	3.28	42	110.25	86	462.25
7½	3.51	43	115.56	87	473.06
7¾	3.75	44	121.00	88	484.00
8	4	45	126.56	89	495.06
8¼	4.25	45.25	128	90	506.25
8½	4.51	46	132.25	90.50	512
8¾	4.78	47	138.06	91	517.56
9	5.06	48	144.00	92	529.00
9¼	5.34	49	150.06	93	540.56
9½	5.64	50	156.25	94	552.25
9¾	5.94	51	162.56	95	564.06
10	6.25	52	169.00	96	576.00
11	7.56	53	175.56	97	588.06
11.31	8	54	182.25	98	600.25
12	9.00	55	189.06	99	612.56
13	10.56	56	196.00	100	625
14	12.25	57	203.06		

American Photographic Societies

This list is compiled from information received from an inquiry form sent to the societies during the latter half of 1922. It includes many societies not given in the 1922 Annual, but falls short of completeness as a record of the photographic societies of America. Secretaries of societies not here listed are urged to send us particulars of their organization so that the list may be fully representative of society activities.—Editor.

ALLENTOWN CAMERA CLUB—Allentown, Pa. Headquarters, 708 Hamilton St. *President,* Chas Schellenberger; *Vice-President,* Moulton Frantz; *Secretary,* W. Ross Angstadt, 127 N. Franklin St., Allentown, Pa. Member Associated Camera Clubs of America. Meetings every Tuesday. Membership, 45.

AMERICAN INSTITUTE PHOTOGRAPHIC SECTION—New York City. Headquarters, 322-324 West 23d Street. Established March 26, 1859. Stated meetings, first and third Mondays of each month. No meetings during Summer months. *Chairman,* Oscar G. Mason; *Vice-Chairman,* Robert A. B. Dayton; *Treasurer,* James Y. Watkins; *Secretary,* John W. Bartlett, M.D., F.R.P.S., 149 West 94th Street.

ASSOCIATED CAMERA CLUBS OF AMERICA. Headquarters, 27 Franklin St., Newark, N. J. *President,* Todd Hazen, Oregon Camera Club, *Vice-President,* M. R. Witt, Photographic Society of Phila.; *Secretary,* Louis F. Bucher, Newark Camera Club; *Treasurer,* Henry C. Brewster, Newark Camera Club. Association Slide Director, W. R. Frisbie, New Haven Camera Club; Association Print Director, E. Roy Monroe, Portland (Me.) Camera Club. Motive—Closer affiliation of Camera Clubs, Annual exhibits, Interchanges of Prints and Slides, as well as ideas, literature and the general promotion of artistic photography through the medium of the Camera Club or Photographic Society. Membership, thirty-four clubs. Association organized May 1, 1919. Correspondence invited with non-member organization and those desiring to form a club or society.

BERKSHIRE PHOTOGRAPHIC SOCIETY—Headquarters, care of A. W. Jacobs Studio, 30 North St., Pittsfield, Mass. Meetings 2nd Friday of each month. Member Associated Camera Clubs of America.

BOULDER CAMERA CLUB—Care of University of Colorado, Boulder, Colo. *President,* Severance Burrage.

BOSTON CAMERA CLUB—Boston, Mass. Established 1881. Incorporated 1886. Membership, 75. *President,* P. Hubbard; *Secretary,* John H. Thurston, 50 Bromfield Street.

BOSTON YOUNG MEN'S CHRISTIAN UNION CAMERA CLUB—Boston, Mass. Headquarters, 48 Boylston Street, Boston. Organized, 1908. *President.* Herbert B. Turner; *Vice-President,* Gardner R. P. Barker; *Treasurer,* F. Chester Everett; *Secretary,* Ernest Gustavsen, 234 Hyde Park Ave., Forest Hills. Meetings first Tuesday each month at club rooms, 48 Boylston Street. Member Associated Camera Clubs of America.

BROOKLYN INSTITUTE OF ARTS AND SCIENCES, PHOTOGRAPHIC SECTION—Headquarters, Academy of Music Building, Lafayette Ave., Brooklyn, N. Y. Organized 1886. Membership 75. Meetings for general discussion and criticism the second Monday each month except July and August. Courses in Rudiments of Photography, Advanced Photography, Pictorial Photography, Loan Exhibitions. Annual exhibit of the Department in May. Demonstrations of the various processes every third Friday evening. *President,* Wm. Elbert Macnaughton; *Vice-President,* Wm. Alexander Alcock; *Secretary,* Sophie Louisa Lauffer, 645 Putnam Ave., Brooklyn; *Treasurer,* J. Halstead Patterson.

BUFFALO CAMERA CLUB—Buffalo, N. Y. Headquarters, Kinne Building, corner Main and Utica Streets. Annual election of officers, fourth Thursday in April; regular meeting nights, second and fourth Tuesdays of each month. *President,* C. R. Phipps; *Vice-President,* C. L. Moore; *Secretary,* R. R. McGeorge, 142 Dorchester Road. Member Associated Camera Clubs of America.

CALIFORNIA CAMERA CLUB—San Francisco, Cal. Headquarters, 833 Market St., San Francisco, Cal. Established March 18, 1890. Incorporated April 5, 1890. Membership 375. Date of meeting second Tuesday, monthly. Monthly print exhibitions and illustrated lectures. *President.* Edward H. Kemp; Secretary, Wm. C. Mackintosh. Members of other clubs are cordially invited to visit our rooms when in San Francisco. Member Associated Camera Clubs of America.

THE CAMERA CLUB—New York. Headquarters, 121 West 68th St. Established in 1884 and incorporated in 1896 upon consolidation with the New York Camera Club, 121 West 68th St. Membership 245. Annual meeting first Thursday after the first Monday in January. *President*, J. Henry; *Secretary*, W. N. Capen. Affiliated with The McKinley Royal Photographic Society of Great Britain.

"CAMERADS"—New Brunswick, N. J. Headquarters, corner Church and George Streets. Established April 24, 1890. *Secretary*, Harvey Iredell; D.D.S., Lock Box 34, New Brunswick.

CAMERA CLUB OF CINCINNATI, Cincinnati, Ohio—Formed 1913. Reorganized June, 1921. Membership 35. Club and dark-rooms Arno Building, 4th and Sycamore Streets. Meetings first and third Mondays of each month. *President*, Chas H. Partington; *Vice-President*, Alice F. Foster; *Secretary*, G. A. Ginter. Member of the Associated Camera Clubs.

CAMERA CLUB OF WATERBURY—Waterbury, Conn., P. O. Box 712. Organized Sept., 1919. Meets Monday evenings at the Y. M. C. A. Room 10, 136 West Main St. *President*, Arthur H. Ganung; *Secretary*, Hollis M. French. Member Associated Camera Clubs of America.

CAMERA PICTORIALISTS OF LOS ANGELES—Los Angeles, Cal. Headquarters, 811 Washington Building. Association formed for strictly pictorial work; the holding of an annual International Salon; and for the good of the cause generally. Meeting, first Monday of month. *Director*, W. A. Hudson; Secretary, N. P. Moerdyke.

CAPE ANN CAMERA CLUB—Headquarters, Gloucester, Mass.

CAPITAL CAMERA CLUB—Washington, D. C., 638 I Street, N. W. Founded May 1, 1891. Annual meeting, first Thursday in January. *President*, Frederick L. Pittman; *Vice-President*, G. W. Anderson; *Secretary*, George M. Miller, 638 I St., N. W.; Treasurer, J. H. Weimer; *Librarian*, Miss Lucy Powell. Date of annual exhibition, March. Member Associated Camera Clubs of America.

CENTRAL Y. M. C. A. CAMERA CLUB— Headquarters, 1421 Arch Street, Philadelphia, Pa. Club organized 25 years ago. Meetings, third Monday in Month. *President*, Bernard B. Wolff; *Vice-Presidents*, R. E. Wilson, J. F. Jackson; *Secretary-Treasurer*, S. R. C. Cooper. Membership, 62. Member Associated Camera Clubs of America.

CHAFFEY CAMERA CLUB—Ontario, Upland, Cal. Headquarters, Chaffey Library. Meetings held second Wednesday of each month, 7.30 p. m. *President*, Norban Hargrove; *Vice-President*, Francis Wagner; *Secretary-Treasurer*, Albert Salter.

CHICAGO CAMERA CLUB, Chicago, Ill. Headquarters, 31 W. Lake Street. Established February 14, 1904. Incorporated February 19, 1904. Meetings every Wednesday. *President*, Raymond W. Trowbridge; *Vice-President*, Arthur E. Anderson; *Secretary*, Frank W. Hatten, 5943 Winthrop Ave.; *Treasurer*, Nils Tempte. Member Associated Camera Clubs of America.

CHICAGO PHOTO FELLOWS—Chicago, Ill. Organized September 8, 1909. Membership, 8. *Correspondent*, F. M. Tuckerman, 1109 Railway Exchange, Chicago.

CLEVELAND PHOTOGRAPHIC SOCIETY—Cleveland, Ohio. Headquarters, The Towers, 6106½ Euclid Ave. Established June 7, 1913. Permanent organization effected at meeting of June 18. Incorporated October 9, 1920. Meetings every Wednesday. *President*, A. H. Bemis; *Vice-President*, C. H. Shipman; *Financial Secretary*, Max E. Reuter; *Corresponding Secretary*, H. G. Cleveland; *Treasurer*, G. Y. Tange. Member Associated Camera Clubs of America.

COLUMBIA PHOTOGRAPHIC SOCIETY—Philadelphia, Pa. Headquarters, 4605 Germantown Ave., Philadelphia. Established 1889. Incorporated July 3, 1894. Membership, 80. Business meeting first Monday of each month; other Mondays, lectures or demonstrations. Member Associated Camera Clubs of America. *President*, C. E. Harrison; *Vice-President*, H. E. Cassel; *Treasurer*, Allan Falconer; *Secretary*, C. F. Davis.

DALLAS CAMERA CLUB, 320½ North Ervay St., Dallas, Tex. Organized July 20, 1921. *President*, A. M. Belsher, *Vice-President*, V. H. Schoffelmayer, *Secretary-Treasurer*, E. H. Brown. Regular meetings every Tuesday. Monthly competition. Free school for amateurs every Friday evening. Annual competition about November. Membership, 35.

DARTMOUTH CAMERA CLUB—Headquarters, 7-8 Robinson Hall, Hanover, N. H. Organized, 1915. Membership, 30. *President*, Jack Strauss. All communications addressed to Prof. Leland Griggs, Hanover, N. H. Member Associated Camera Clubs of America.

DETROIT CAMERA CLUB—Detroit, Mich. (Reincorporated, January, 1921). Club rooms, 43 Montcalm St. West. *President*, P. M. Hickey, M.D.; *Vice-President*, H. F. Wegener; *Secretary-Treasurer*, W. E. Taylor, 314 W. Congress St., Detroit, Mich. Member of the Associated Camera Clubs. Meetings held in the club rooms every Friday evening. Visitors welcome.

ELMIRA CAMERA CLUB—Elmira, N. Y. Headquarters, 116 Baldwin Street, Elmira. Established 1902. Membership, 30. Meets first Wednesday each month. *President*, C. G. Leonardi; *Secretary-Treasurer*, E. Radeker Stancliff, 240 Lake Street. Member Associated Camera Clubs of America.

ELYSIAN CAMERA CLUB—307 Washington St., Hoboken, N. J. Established 1902. Date of meeting second Thursday of each month. Membership 68 active. *Hon. Pres.*, Julius Nelson; *President*, Paul Marsicano; *Vice-President*, Adolph Geiger; Secretary, J. Henry Wendt, 805 Washington St., Hoboken, N. J. Member Associated Camera Clubs of America.

GUILD OF PHOTOGRAPHERS OF THE SOCIETY OF ARTS AND CRAFTS OF BOSTON, MASS—*Dean*, Herbert B. Turner; *Secretary and Treasurer*, Ralph Osborne; *Councilors*, Mrs. Dorothy Jarvis, Alton H. Blackinton. Organized Feb. 18, 1916. Meetings held at members' studios.

GLASSBORO HIGH SCHOOL CAMERA CLUB—Headquarters High School Building. Organized and established 1919 under the direction of Prof. J. A. Ernest Zimmermann. Meets every first and third Tuesday during the school year. Membership 45. Composed of students and alumni. *President*, Seldon Aylsworth; *Vice-President*, J. A. Kaiser; *Secretary-Treasurer*, Ruth Lippincott. Club conducts a yearly prize exhibit during the month of April.

GRAND RAPIDS CAMERA CLUB—Member Associated Camera Clubs of America. Headquarters, 106 Monroe Street, where demonstrations and inspiration meetings are held each Thursday evening from September to June, inclusive, with occasional field days during the summer months. *President*, Prof. H. C. Doane; *Vice-President*, J. O. Rogers; *Treasurer*, A. Steenhagen; *Secretary*, Miss Loa G. Winegar. Member Associated Camera Clubs of America.

INDIANAPOLIS CAMERA CLUB—Headquarters, 406 Rauh Bldg., Indianapolis. Member Associated Camera Clubs of America.

INTERNATIONAL PHOTOGRAPHIC ASSOCIATION—San Francisco, Cal. Founded 1908. *President*, F. B. Hinman, Evergreen, Col.; *General Secretary*, A. E. Davies, 1327 Grove St., Berkeley, Cal.; *Director Post Card Division*, John Biesman, Hemlock, Ohio; *Director Lantern-Slide Division*, A. E. Davies, 1327 Grove Street, Berkeley, Cal. *State Secretaries*: California—A. E. Davies, 1327 Grove St., Berkeley. Colorado—H. E. High, 1023 Champa St., Denver. Idaho—Eugene Clifford, 902 9th Ave., Lewiston. Iowa—Harry B. Nolte, Algona. Kansas—H. H. Gill, Hays City, Louisiana—Samuel F. Lawrence, 1247 Oakland Street, Shreveport. Mississippi—George W. Askew, Jr., 211 34th Ave., Meridian. Missouri—J. F. Peters, Room 210 Union Station, St. Louis. New York—Louis R. Murray, 927 Ford Street, Ogdensburg. Oregon—F. L. Derby, La Fayette. Texas—Emmett L. Lovett, care Southern Electric Company of Texas, Wichita Falls. *Album Directors*: Alabama—Richard Hines, Jr., Barton Academy Bldg., Mobile. Colorado—O. E. Aultman, Plested Bldg., Trinidad. Connecticut—Harry E. Carpenter, 389 Remington Ave., Bridgeport. Florida—Capt. E. S. Coutant, Lock Box 73, Stuart. Georgia—L. O. Surles, P. O. Box 434, Cuthbert. Idaho—Eugene Clifford, 902 9th Ave., Lewiston. Illinois—George A. Price, Box 286, Champaign. Iowa—C. W. Parker, Mapleton. Maryland—E. G. Hooper, 218 East 20th Street, Baltimore. Massachusetts—John Mardon, 10 High Street, Boston. Michigan—W. E. Ziegenfuss, M. D., 171 Richton St., Detroit. Minnesota—Leonard A. Williams, 622 2nd Avenue South, St. Cloud. Mississippi—George W. Askew, Jr., 211 34th Ave., Meridian. Missouri—Wharton Schooler, R. F. D. No. 2, Eolia. New York—Charles F. Rice, P. O. Box 517, Mamaroneck. North Dakota—Jas. A. Van Kleeck, 619 Second Ave., North Fargo. Ohio—J. H. Winchell, R. F. D. No. 2. Painesville. Pennsylvania—L. A. Sneary, 2822 Espy Ave., Pittsburgh. South Dakota—C. B. Bolles, L. B., 351, Aberdeen. Texas—J. B. Oheim, P. O. Drawer M. Henrietta. Utah—John C. Swenson, A. B. Provo. West Virginia—William E. Monroe, Box 298, Point Pleasant.

KANSAS CITY CAMERA CLUB, 1919-1920—Suite 501, Bryant Building, Kansas City, Mo. Organized 1914. Club meets second Monday of each month. Annual exhibition in November. *President*, J. G. Sarvent; *Vice-President*, Val. B. Mintun; *Secretary-Treasurer*, Dr. Maclay Lyon. Member Associated Camera Clubs of America.

KODAK PARK CAMERA CLUB—Kodak Park, Rochester, N. Y. Organized Jan. 6, 1920. Meetings held bi-monthly. *President*, Alfred Hargreave; *Vice-President*, Karl Gruppe; *Secretary*, G. Harold Hudson, Kodak Park; *Treasurer*, Miss Edna Pownall. Member Associated Camera Clubs of America.

LOWELL Y. M. C. A. CAMERA CLUB—Lowell, Mass. *Secretary*, N. R. Farnum.

MILWAUKEE CAMERA CLUB—Milwaukee, Wis. Organized January, 1921. Meets every second and fourth Tuesdays of each month. Meetings held in the trustee's room, Milwaukee Public Museum. *President*, B. C. Demium; *Vice-President*, John H. Becker; *Secretary-Treasurer*, Albert Goerlitz, 749 27th Street.

MOLINE Y. M. C. A. CAMERA CLUB—Headquarters, Moline, Ill.

MONTREAL AMATEUR ATHLETIC ASSOCIATION CAMERA CLUB—Montreal, Canada. Headquarters, M. A. A. A. Building, 250 Peel Street. Organized May 1, 1906. *President,* Gordon K. Miller; *Vice-President,* Walter G. D. Boronow; *Treasurer,* R. E. Melville; *Hon. Secretary,* P. F. Calcutt. Exhibitions: Annual, April; Local, November.

NEWARK CAMERA CLUB, INC.—27 Franklin Street, Newark, N. J. Organized 1888. Incorporated 1910. Meetings, second and fourth Mondays in each month. Motto, "SOMETHING OF INTEREST EVERY MONDAY NIGHT." *President,* J. Raymond Boyle; *Vice-President,* Charles Knapp; *Secretary,* Edwin Wick; *Treasurer,* Henry C. Brewster. Membership now 200 active. Member and organizer of Associated Camera Clubs of America. Visitors Welcome.

NEW BRITAIN CAMERA CLUB—Organized 1892. *President,* W. B. Rossberg; *Vice-President,* E. H. Start; *Secretary-Treasurer,* Paul A. Stahl, 260 Corbin Avenue, New Britain, Conn. Meets first and third Tuesdays, 173 Main Street. Member Associated Camera Clubs of America.

NEW HAVEN CAMERA CLUB—17 Broadway. Organized 1911. Membership, 41. *President,* Frank R. Lawrence; *Vice-President,* Paul B. Hunt; *Secretary-Treasurer,* William R. Frisbie, 172 Norton St., New Haven, Conn. Meetings held every Thursday. Business meetings, First Thursday in the month. Member Associated Camera Clubs of America.

ORANGE CAMERA CLUB—East Orange, N. J. Headquarters, Main and Clinton Streets. Established March 21, 1892. Incorporated May 19, 1893. Membership, 115. Date of meetings, first and third Saturdays of each month, except July, August and September. *President,* Robert M. Crater; *Secretary,* Ernest Williams, Main and Clinton Streets, East Orange N. J.

OREGON CAMERA CLUB,—Portland, Oregon. Headquarters, Fifth Floor Elks' Building. Established 1895. Incorporated 1903. Membership, 100. Meetings first and last Wednesday of each month. *President,* E. C. Churchill; *Secretary,* C. W. Bernhardt. Date of annual exhibit, early in spring. Member Associated Camera Clubs of America.

PHOTOGRAPHIC CLUB OF BALTIMORE CITY—Baltimore, Md. Headquarters, 329 Park Avenue. Established 1885. Incorporated 1890. Membership, active, 60. Meetings, first Tuesday in month. *President,* A. Gustafson, Baltimore; *Vice-President,* Percy M. Reese; *Secretary,* A. H. Goldsborough, Baltimore. Member Associated Camera Clubs of America.

PHOTO FELLOWS CLUB—Vancouver, Canada. Headquarters, 650 Granville Street. *Secretary-Treasurer,* Lieut. J. Green, R. N. V. R.

PHOTOGRAPHIC SOCIETY OF PHILADELPHIA—Philadelphia, Pa. Headquarters, 1615-1617 Sansom Street. Established November, 1862. Incorporated April 24, 1885. Membership, 100. Date of meetings: Members, second Wednesday. *President,* William W. Chambers; *Secretary,* E. A. McKinley, 1615 Sansom Street; *Treasurer,* H. F. A. Starr. Date of members' annual exhibition, March. Member Associated Camera Clubs of America.

PICTORIAL PHOTOGRAPHERS OF AMERICA—New York City. Headquarters, Art Center, 65 East 56th Street. Meetings first Monday evening in each month from October to June. *President,* Dr. A. D. Chaffee; *Vice-President,* John Paul Edwards; *Hon. Vice-Presidents,* Gertrude Kasebier, Prof. Charles F. Chandler, Clarence H. White; *Treasurer,* S. Louisa Lauffer; *Recording Secretary,* Wm. A. Alcock; *Corresponding Secretary,* Joseph R. Mason. Member Associated Camera Clubs of America.

PHOTO PICTORIALISTS OF CINCINNATI—Cincinnati, Ohio. Organized, 1920. Work devoted to advancement of pictorial photography. Membership, six. Meetings on call only. Chas H. Partington, director; G. A. Ginter, Robt. P. Nute, Chas. A. Weddigen, Harry W. Green, Peter Scherrer. Address communications to the director, 4113 Thirty-second Street.

PICTORIAL PHOTOGRAPHIC SOCIETY OF SAN FRANCISCO, CAL.—*Director,* Anson Herrick; *Vice-Director,* L. Goetz; *Secretary-Treasurer,* Percy Neymann, Ph.D., 45 Stockton St., San Francisco; *Secretary Salon Committee,* H. A. Hussey, 64 Pine St., San Francisco.

PITTSBURGH ACADEMY OF SCIENCE AND ART (PHOTOGRAPHIC SECTION)—Pittsburgh, Pa. Headquarters, Carnegie Institute, Schenley Park. Organized January 23, 1900. Membership, 100. Meetings, second and fourth Tuesdays in each month at Carnegie Institute. *President,* O. C. Reiter, 2424 Penn Avenue; *Vice-President,* N. S. Woodbridge; *Secretary-Treasurer,* Chas. K. Archer, 1412 Carnegie Bldg., Pittsburgh, Pa.; *Lantern-Slide Director,* P. F. Squier; *Print Director,* S. A. Martin. Annual salon, Carnegie Art Gallery, March. Address all communications to Chas. K. Archer, Secretary, 1412 Carnegie Bldg., Pittsburgh, Pa.

PITTSBURGH PHOTOGRAPHIC SOCIETY—Pittsburgh, Pa. Headquarters, North Side Community House. Established June, 1921. Membership, 25. *President,* Charles W. Doutt; *Secretary,* John Allen; *Treasurer,* M. P. Beers.

PITTSBURGH SALON OF PHOTOGRAPHIC ART—Pittsburgh, Pa. Under auspices of Photographic Section of the Academy of Science and Art. Membership consists of the leading pictorialists in the United States. *President*, O. C. Reiter, 2424 Penn Avenue, Pittsburgh, Pa.; *Secretary*, Charles K. Archer, 1412 Carnegie Bldg., Pittsburgh, Pa. Salon held Carnegie Institute March. Last day of entry, February 7th.

POLYTECHNIC CAMERA CLUB—Polytechnic Institute of Brooklyn, 99 Livingston St., Brooklyn, N. Y. Organized May 15, 1921. Meets second and fourth Tuesdays, 12.30 p. m. *President*, Joseph R. Fisher, 1555 74th St.; *Secretary*, Edward Breiteirser, 2703 Bainbridge Ave., Bronx, N. Y.

PORTLAND CAMERA CLUB PHOTOGRAPHIC SECTION OF THE PORTLAND SOCIETY OF ART—Portland, Me. Headquarters, L. D. M. Sweat Memorial, Spring corner High Street. Established 1899. Membership, 105. Date of meetings every Monday evening. *President* Alfred Brinkler; *Vice-President*, H. A. Peabody; *Secretary-Treasurer*, C. M. Jaquith, 515 Congress St. Date of annual exhibition, in March. Member Associated Camera Clubs of America.

POSTAL PHOTOGRAPHIC CLUB—Headquarters, Washington, D. C. Established December, 1888. Membership, 40. Date of meetings, no regular meeting. *President*, Charles E. Fairman; *Secretary*, Ernest L. Crandall, 1331 Newton Street, N. E., Brookland, Washington D. C. Albums circulate among members monthly, except August and September.

READING CAMERA CLUB—Reading, Pa. Headquarters, 610 Court St. Established 1913. Meetings first and third Thursdays of each month. Quarterly exhibits for members only. Annual exhibit early in March. *President*, Dr. Frederick Willson; *Secretary*, L. Roy Frey, 922 Hamilton Place, Wyomissing, Pa. Member Associated Camera Clubs of America.

SAN DIEGO Y. M. C. A. CAMERA CLUB—San Diego, Cal. Organized January, 1920. Headquarters, Y. M. C. A., San Diego, Cal. *President*, Harold A. Taylor; *Vice-President*, Ivor N. Lawson, Jr.; *Secretary-Treasurer*, Homer C. Miller. Annual exhibition in May. Member Associated Camera Clubs of America.

SOUTHERN CALIFORNIA CAMERA CLUB—213 Columbia Bldg., 313 W. 3rd St., Los Angeles. Membership 120. *President*, W. C. Sawyer; *Vice-President*, C. Williams; *Secretary*, R. L. van Oosting; *Treasurer*, (Miss) Maud Robertson. Meetings every Thursday night. Course in Photography. Both open to the public. Membership Associated Camera Clubs of America. Send notices, public exhibitions, contests and salons.

ST. LOUIS CAMERA CLUB.—St. Louis, Mo. Organized February 12, 1914. Devoted to the interest and advancement of the art of photography. Meetings every first and third Thursdays at 8 p. m., Barr Branch Library, Jefferson and Lafayette Aves. *President*, John D. Pursell; *Vice-President*, R. L. Jungling; *Secretary*, O. J. White, 1729 California Ave., St. Louis, Mo. Member Associated Camera Clubs of America.

SWAIN CAMERA CLUB—New Bedford Mass. *Secretary*, Herbert J. Harper, 95 Walden St.

TELEPHONE CAMERA CLUB—Headquarters, 964 Sherman Ave., New York. *Secretary*, W. J. Marshall.

TRENTON PHOTOGRAPHIC SOCIETY—Headquarters, 209 East State St., Trenton, N. J.

UTAH CAMERA CLUB—Salt Lake City, Utah. *President*, Geo. I. Reeves; *Secretary*, Thomas O. Sheckell, 1411 Walker Bank Bldg.

WASHINGTON Y. M. C. A. CAMERA CLUB—Washington, D. C. Headquarters, Central Y. M. C. A. Building. Membership, 32. *President*, Myron F. Myers; *Secretary*, Miss Elizabeth N. Brownley, 908 Que St., N. W.

WESLEY CAMERA CLUB—Headquarters, Bell Theatre Building. Organized April 6, 1912. Meeting the first Monday of each month. *President*, Lester Lease; *Vice-President*, H. H. Flom; *Secretary and Treasurer*, W. A. Drewelow, Wesley, Iowa.

WILKES-BARRE CAMERA CLUB—Headquarters, 131 South Main St., Wilkes-Barre, Pa. Organized 1901. Meet every Tuesday evening 8 o'clock. *President*, Jos. Hogarth; *First Vice-President*, A. G. Reisser; *Secretary*, A. P. Salyer; *Treasurer*, Albert Williams, Jr. Member Associated Camera Clubs of America.

YONKERS CAMERA CLUB—Yonkers, N. Y. Headquarters, 782 Warburton Ave. *President*, W. R. Cronk; *Vice-President*, Wm. Beck; *Secretary*, Elijah F. Munn, 11 Van Cortland Park Ave., Yonkers, N. Y.; *Librarian*, C. B. Carling; *Trustees*, F. W. Wocher, Wm. D. Mitchell, Geo. H. Stengel.

The American Annual of Photography 1924

VOLUME XXXVIII

Edited by Percy Y. Howe

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THE SWAN. Dr. D. J. Ruzicka.

PREFACE

PHOTOGRAPHY has at last reached a position where we can truthfully say it has a place in all our lives, whether we are actively engaged in it or not.

The editorial work on the Annual is properly confined to the gathering of interesting and instructive material pertaining to photography, and presenting it in a readable and attractive manner.

This volume is composed entirely of the work of amateur and professional photographers here and abroad. The contributed papers cover almost every branch of photographic activity, and the illustrations form a representative collection of the best work of the year.

I wish to express my sincere thanks to all who in any way assisted in the making of this book, especially those whose contributions I have been compelled to omit through lack of space.

Manuscripts or prints to be submitted for the 1925 volume should be sent to me at 422 Park Hill Avenue, Yonkers, N. Y., so as to reach me any time prior to August 1st, 1924.

PERCY Y. HOWE, Editor.

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Nickolas Muray.

The American Annual of Photography · · 1924

HAND WORK IN PHOTOGRAPHY

By PAUL L. ANDERSON

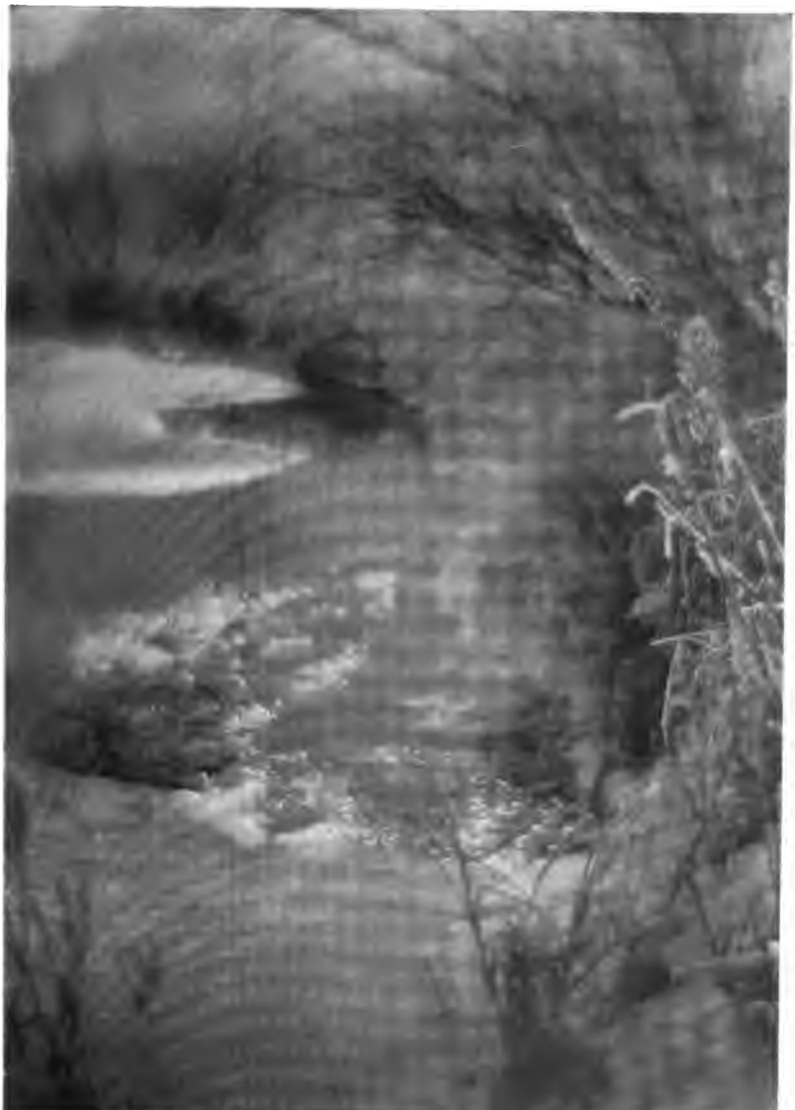
THERE are almost as many definitions of the term "fine art" as there are persons interested in the subject. The Standard Dictionary defines art as "the embodiment of beautiful thought in sensuous form." In "The Fine Art of Photography" the writer used the following: ". . . any medium of expression which permits one person to convey to another an abstract idea of a lofty or ennobling character, or to arouse in another a lofty emotion." A third definition is; "a means of conveying an idea or arousing an emotion through the use of symbols." Still another—very succinct—is; "Nature seen through a temperament." And other examples might be given, all expressing the same general idea.

It will be seen that, in the main, two elements enter into these various definitions; first, an intellectual quality in the response evoked; and second, a co-existing sensuous quality. In other words, a work of fine art must convey an idea, and must also contain some measure of abstract beauty. Now, it is quite possible for a painting, a piece of sculpture, or a literary composition to contain abstract beauty without conveying any thought; a simple line drawn in pencil on a sheet of white paper may possess this quality. But it is not possible for any medium of expression except words—that is, literature—to convey an abstract idea without a very definite response on the part of the observer. The only way in which a painting, a photograph, a piece of sculpture, or a musical

composition can convey a thought is by reminding the observer of something which he has seen or heard. It may be, and if the work of art is of high quality it certainly will be, that the resulting suggestion carries a sympathetic observer beyond mere recollection and suggests to him ideas above those originating in his own mind; this is, in fact, the function and purpose of art; unless this happens the painting or sculpture or music is a dead thing, of no value whatever. It follows, then, that a photograph, to qualify as a work of fine art, must possess inherent beauty of line and value, and must also convey a lofty idea to the spectator. Let us see to what extent and in what circumstances this proves to be the case.

Photography, like all graphic arts, depends upon the use of symbols for its expression. The untrained mind sees in a photograph or a drawing merely an arrangement in black and white; show a photograph to an African savage, and it means absolutely nothing whatever to him. But we are accustomed, from childhood up, to associate these familiar symbols with actualities; a baby still unable to talk is shown a picture and learns to associate it with the sound "cat." Later, he is shown a real cat, and associates that with the same sound, naturally reverting also to the remembered picture. It is true that he generally is taught to associate the actual animal with the sound "nice kitty—here, kitty, kitty!" but he eventually gets the matter straightened out in his mind, and has learned to recognize a symbol. And so with everything else. As a matter of fact, a photograph of a tree or a house does not in the least resemble the actual tree or house; it simply reminds us of the original through the association of symbols. A great writer has said that it is very doubtful if any man has ever succeeded in conveying to another, through the medium of words, the precise abstract idea which he had in mind, and if this is true of so highly intellectual a form of expression as speech, it behooves us to study with extreme care the manner in which we will employ our symbols in an art where the intellectual quality is often subordinated to the sensuous.

There are at the present time two more or less sharply defined schools of thought in photography, working along different lines and with different purposes in view. The first school maintains—in its productions if not in a formal creed—that the whole duty of an artist is to produce a pleasing



JANUARY FROSTS. LOU SWEET.

arrangement of pattern and values and texture; that if this is accomplished no more is necessary, the subject being a matter of relative if not complete indifference. This school may be dismissed very briefly; to attain the desired end it is merely necessary to cultivate a sensitiveness to sensuous beauty and to develop a moderately skilful technical facility; this being done, it is a simple matter to find subjects in nature which, photographed directly, present the necessary elements of beauty; a spray of leaves against the sky, a vase set in a blaze of sunlight, reflections in rippling water—such subjects are everywhere, and require but little search, little thought, and no manipulation of negative or print beyond the purely chemical. And it may be added, without injustice, that results so easily achieved own but little of permanent value, though in absolute fairness it is necessary to add that this trend of thought, originating with the now defunct Photo Secession, has done good service in broadening the views of amateur photographers, and causing them to give attention to a phase of the work which was formerly ignored.

The other of the two classes of photographic workers places subject first, assigning to pattern, print quality, and surface texture a valued place as aids to expression, but holding them strictly subordinate to the main purpose, namely, the stimulating of an emotion. It should be noted that this phrase, "stimulating an emotion," is often loosely employed by pseudo-artists, who make use of it with reference to pictures which are purely sensuous in character; correctly speaking, the arousing of an emotion involves an intellectual response, and can take place only when the picture referred to possesses some measure of intellectual quality. A picture of the higher order is not merely one single entity, utterly homogeneous, like a dab of protoplasm, and having a relatively simple purpose, but is a collection of incidents or characteristics, all more or less perfectly harmonized and synthesized with a view to evoking several responses which in turn shall be synthesized toward a whole larger than the component parts.

When the photographer belongs to the second class, and wishes to produce a picture owning some durable quality, it becomes necessary for him to consider first what emotion it is that he desires to evoke; whether joy, pleasure, contentment, calm, sadness, horror, or some other. As a matter of fact, but

SUNNY CORNER. J. ARTHUR LOMAX, F.R.P.S.

few pictures are built up in any such deliberate fashion; as a rule, some subject makes a strong personal appeal to the photographer, and he sets himself to pass on this appeal to his public, but it is imperative that he decide in his own mind just what effect he wishes to produce, and then consider the means to be used in gaining this result. Many different elements must be taken into consideration; the forms of objects, their arrangement within the picture space, the character and direction of the light, the scale and the key of the negative and of the resulting print, the color of the print and of the paper stock on which the print is made, the adjustment of values within the print, and the texture of the stock—also, the size is of importance, for although one may be completely esthetic in a print one by two inches (physical magnitude has nothing to do with composition and values) it is a fact that the larger the print the greater its emotional appeal. There are of course, exceptions to this matter of size, but in general the fact is as stated.

The various purely photographic elements going into the making of the picture having been settled upon, there remains the question of whether the photographer will simply accept the arrangement of subject and of relative values offered by the camera, or will elect to modify either linear pattern or values of both, and it is a discussion of this matter which really constitutes the purpose of the present essay.

It rarely happens that nature affords a perfect picture of the second class. Perfect patterns of line and mass and value are common enough, but when one is intent on producing an emotional effect nature seldom offers an arrangement which, translated into terms of lens and plate, is competent to produce the desired result, though such arrangements, viewed directly in nature, are by no means rare. One of Whistler's pupils once said to him:

"Oh, Mr. Whistler! When I was coming into town this morning I looked out of the train window, and it looked just like one of your pictures!"

"Yes," replied Whistler, pompously, "Nature's creeping up. She's creeping up!"

Now, this answer was unquestionably sardonic; Whistler may have been self-satisfied, but he was no fool. But the reply contains an element of truth, for all that. Nature has

PORTRAIT, MRS. WM. AUERBACH-LEVY. RABINOVITCH.

so much else to offer, so many elements which cannot be translated into a picture, that the artist is forced to choose, to select, to reject, to modify, in order to produce a combination of symbols which will stir the beholder's emotions. Nature works on a vast scale, the artist on a small one; nature shows objects stereoscopically, the artist with monocular vision; nature owns an intensity of light and a brilliance of color far beyond anything possible to painter or photographer; nature has motion and sound, but a picture is silent and still; nature has a gamut of values incomparably superior to that afforded by palette or printing-frame. So the artist must adjust his symbols in such fashion as to suggest nature—not to delineate; an attempt at direct portrayal is inevitably foredoomed to failure.

Since nature but rarely offers us an arrangement fully and completely satisfactory, it follows that the photographer must either be content with partial success, or must rearrange nature's masses and values to produce the effect he aims at. In this connection, it is significant that the photographers who are most insistent on pure photography, who decry most violently any attempt at hand work on negative or print, are precisely those whose endeavors are limited to pure estheticism; the workers who seek for emotional effect do not hesitate to modify as seems to them best.

It is not the purpose of the present essay to outline technical methods of manipulating negatives and prints; there are many books and articles devoted to methods. But it is desired to point out, even to emphasize the necessity for being prepared to work over one's plates and prints, and to suggest the limits which must be observed in so doing.

It is, of course, obvious that apparent absurdities must be avoided; cast shadows falling toward the light, clouds printed in over the sail of a boat—these faults are self-evident, but there is a subtler error that is all too frequent, in the form of impossible values, of shadows that are too dark, or lights that are too light. It is possible for relative values to be true to nature but false to art, and it is in a measure possible for them to be true to artistic effect—not to art—yet false to nature. And though values which are false to nature may be striking to the eye and powerful in effect, yet a picture in which they are found can never be permanently satisfactory. It is obviously

SIMPLICITY. ALBERT WILLIAMS, JR.

not intended to imply that Nature's values must be slavishly adhered to, but the values employed should be those that are possible or nearly so. One of the writer's most successful prints shows a valley with a bank of mist rolling across the hills in the middle distance. Now, as a matter of fact, there was no mist in the air when the picture was taken, but the atmospheric effect is a wholly possible one. Nor does a slight exaggeration of natural values do any harm; it is often exceedingly helpful. But some workers show a tendency to produce striking effects by a violent exaggeration of light and dark, and it is this that defeats its own end through startling the observer—a picture, to be durable, must be restful even though at the same time stimulating.

Beyond this question of values lies the fact that an evident mixture of mediums is a thing to shun. The ancient Greeks painted their statues; to them sculpture and painting were not things apart, but were merely different phases of one artistic medium. Later convention, however, separates the glyptic and graphic arts, and introduces divisions within each, so that painting a statue, tinting an etching or photograph, combining oil and water color, etching a negative, or brushing a print, becomes, to the modern eye, an offence. Frank Eugene was accustomed to etch his negatives, Demachy to brush-develop his gum prints—the results are abortions, but, being made during the experimental stage of modern photography, possess an educational value; in that sense they were thoroughly legitimate. The most modern opinion, however, holds that an evident mixture of mediums is to be avoided. Note carefully the adjective "evident." It is perfectly possible, if the technique be properly chosen and handled, to work over a photograph almost to an unlimited extent, yet have the hand work undiscoverable by the most acute search. And it is precisely this that, ninety-nine times out of a hundred, must be done if the highest effect is to be achieved; a straight photograph remains always a dead thing, machine-made, a product of wood and glass and silver and platinum. It may be beautiful; the whorls and convolutions of an engine-turned watchcase are beautiful; but mathematical precision is uninteresting; the variations introduced by the pliant hand are of intense value; and to rise to the highest levels of art the photographer must inject into his work something of his own personality,

NICKOLAS MURAY.

something of his own thought and feeling, of the hopes and fears and loftiness of soul which raise him above the unthinking beasts.

It is evident that to accomplish this involves far more study and effort than to produce merely pretty pictures. The photographer who aims at the highest expression of his art must know all that the esthetic worker does of pattern and values and technique, and to that must add a study of technical methods, of values, and of psychology undreamed of by the other. But the effort is well worth while; the product is vastly more limited in quantity, it is true, but beyond all question one picture which is remembered, which exerts an influence for good, is worth a thousand of merely pretty things that carry no message, that are admired for a moment, but, being inherently ephemeral, are, their little day past, forthwith discarded and forgotten.

BENEATH THE BRIDGE. PETER G. PETRIDIS.

MARION MORGAN DANCERS. JOHN HOWARD PAINE.

MODIFICATION OF THE PRINTING DEVELOPER

By LLOYD I. SNODGRASS, B. S.

MODIFICATION of the printing developer is oftentimes necessary. While the manufacturer's formula is usually best for a given paper, impurities in the water or chemicals may prevent securing the results desired. Again the photographer may not have at hand suitable paper for a particular negative, and must resort to other means of obtaining his ideal in the matter of tone and contrast. This may be done through changing the proportions of the chemicals used, but in order to do this intelligently, he needs to have definite knowledge of their action.

For the normal metol-hydrochinon developer, the proportions in the following formula are those given by the Ansco, Defender, and Haloid Companies, and differ from the Eastman, principally in that a third more carbonate is used.

Water	1.0 liter	30 ounces
Metol	1.6 grams	22½ grains
Sodium sulphite	24.0 grams	¾ ounce
Hydrochinon	6.6 grams	90 grains
Sodium carbonate	24.0 grams	¾ ounce

For use dilute with equal quantities of water. Add potassium bromide as needed. The amounts given in the metric system are proportional, but not equal to those in the avoirdupois. So one or the other systems must be followed exclusively.

Thus it is seen that a developer is made up of (1) reducing agents as metol and hydrochinon which have the property of liberating metallic silver only in the proportion they have been affected by the light; (2) a preservative, sodium sulphite; (3) an accelerator, sodium carbonate; (4) a restrainer, potassium bromide.

While both metol and hydrochinon are chemical reducers, there are important differences in their action that need to be recognized. Metol, which is not much affected by changes in temperature, causes the image to appear quickly but gain slowly

"IN A WEE COT HOOSE." J. M. WHITEHEAD.

in density, and gives a flat, gray print. Hydrochinon, on the other hand, brings out the image more slowly, but the gain in density is steady and rapid, resulting in a print of greater contrast. It loses in activity with decrease in temperature. Used together, they form an ideal developer, and permit of considerable latitude in the effects obtainable. That is, if less contrast is desired, the metol may be increased, perhaps one half, and the hydrochinon decreased by a proportional amount. The use of a cold developer will also help as this diminishes the energy of the hydrochinon, thus enabling the metol to do most of the work. Conversely, if more contrast is wanted, a warmer developer may be used, the metol decreased, and the hydrochinon increased.

The amount of sodium carbonate may be varied the same as the hydrochinon, being decreased to help lessen contrast. Increase in the amount not only gives greater contrast but speeds up the action. In fact, the speed of development depends more upon the concentration of alkali present than of the reducing agents themselves. Too much, however, will result in fogging the print.

In any modification of the developer, the amount of the sodium sulphite may be left constant as the quantity needed is largely dependent on the amount of water used. Its chief action is to combine with the oxygen of the air which is dissolved in the water, resulting in its being itself oxidized into sodium sulphate, thus preventing the oxidation and consequent deterioration of the metol and hydrochinon.

A developer of this type will usually cause fog by the reduction of the unexposed silver salts unless a restrainer is added. Potassium bromide is most generally used and is added at the time of development to prevent fog. Additional bromide is further used to control the resulting color of the print. An increase in the amount of bromide in the developer slows down the action and results in a tendency for the worker to over-expose, causing underdevelopment and resulting in warm tones. Also, as the bromide is increased and the developing action retarded, the silver is more slowly deposited and in a finer state of division, giving a print with more color.

For example, one drop of a saturated solution to 100 c.c. (3 ounces) of working strength developer will give prints tending toward a blue-black tone, which if sepia-toned will

THE SAIL. George Maillard Kesslere.

be a cold brown or purple. If more bromide is used, as 6 drops per 100 c.c. (2 drops per ounce) of developer, the result will be an increase of warmth with more of an olive color in the black and white print and yellow in the sepia. The proportion of bromide needed, however, is partly dependent upon the paper used. Such papers as the Defender Professional with a naturally cold tone, will require considerable bromide, whereas those like Artura which have a normally warm tone, will need only a small addition of bromide to the developer.

To facilitate the variation of the different chemicals, it is convenient to prepare two bottles of developer of such proportions that used in equal amounts will give a normal developer.

	Soft		Contrast	
Water	1000.0 c.c.	30 oz.	1000.0 c.c.	30 oz.
Metol	2.5 g.	33¾ gr.	.8 g.	11¼ gr.
Sodium sulphite	24.0 g.	¾ oz.	24.0 g.	¾ oz.
Hydrochinon	3.2 g.	45 gr.	10.0 g.	135 gr.
Sodium carbonate	12.0 g.	⅜ oz.	36.0 g.	1⅛ oz.

The soft and contrast developers may be used alone or in combination, being diluted with an equal quantity of water in each case. Potassium bromide is added as needed. If still more softness is desired, potassium iodide may be added. However, if more than .05 g. per 100 c.c. (¼ gr. per ounce) is added, it is likely to cause excessive flatness. Increased softness may also be obtained by over-exposing and soaking the print in plain water for two or three minutes or more before developing.

Especially recommended as a means of variation is the use of a three-solution developer, which permits of great latitude in modifying the contrast, and at the same time has superior keeping qualities.

	A		B		C	
Water	500.0 c.c.	20 oz.	500.0 c.c.	20 oz.	500.0 c.c.	20 oz.
Metol	2.5 g.	45 gr.	....	.....	....	.....
Sodium sulphite	18.0 g.	¼ oz.	18.0 g.	¼ oz.	....	.....
Hydrochinon	....	.....	10.0 g.	180 gr.	....	.....
Sodium carbonate	....	.....	....	.....	36.0 g.	1⅛ oz.

If the metol does not readily dissolve, a small amount of alcohol may be added to (A). By using the following proportions, developers will be obtained having the same contrast as those already given.

For	Use A	B	C	Water
Soft developer	3 parts	1 part	1 part	7 parts
Normal developer	1 part	1 part	1 part	3 parts
Contrast developer	1 part	3 parts	3 parts	5 parts

These proportions may be further varied within reasonable

limits to secure more decided effects. If too much hydrochinon (B) is used, however, the print will have a brown or red tint, while if too much carbonate (C) is used, the print will develop too rapidly and become fogged.

Obviously this developer has good keeping qualities. Solution (A) contains the metol and half the preservative with none of the carbonate, which is the factor causing more rapid oxidation and deterioration; (B) contains the hydrochinon and the other half of the sulphite. (C), containing the carbonate alone, will keep for a long time.

WHISPERING. DR. K. KOIKE.

O. C. CONKLING.

THREE-COLOUR CARBRO

By FREDERIC G. TUTTON, F.R.P.S.

AS this paper will doubtless be read by numerous amateur photographers who are "tyros" yet would like to produce photographs of nature in all the beauty of natural colour, perhaps first a short explanation of the theory of colour photography may help them to grasp the necessary essentials for success.

Most of you know how by means of a spectroscope the composition of white light may be studied, on looking through this instrument a continuous band of colour is presented to the eye commencing with red, then through orange, yellow, green and blue until violet is reached. You have also probably heard of the theory of Professor Helmholtz and Dr. Thomas Young, namely, that all these colours may be formed from three fundamental or primary coloured lights—a red, green and blue violet.

Three-colour photography is based on the principle that all colours occurring in nature can be split up into these three primary colours—red, green and blue—and can be formed again from these same colours. If the image of a coloured object is split up photographically into three constituent images by making three separate negatives, of which one reproduces only the image formed by yellow rays, another, that by the red rays and the third that by the blue rays, transparent monochrome prints from these will if properly superimposed, give a representation of the object true to nature.

To split up the image into these three primary colours, light filters or colour screens are used, and these screens are so adjusted that if in the path of a ray of light which forms the image on the plate, a blue filter is inserted, it transmits all rays except yellow. In other words, the negative when developed will have the red and blue represented by a deposit, but the yellow or any colour containing yellow, will be represented by more or less clear glass. Thus the positive from this negative will only produce the yellow print.

Then another exposure is made on a second plate using a green filter which only transmits green, blue and yellow but absorbs the red rays. In the negative thus obtained, green, blue and yellow will be represented by a deposit, and red clear glass. In printing we shall obtain a red image. Finally to obtain the blue image, an exposure is made on a third plate behind a red filter, which transmits red and yellow but absorbs the blue rays. In this negative the red and yellow form the image, and the blue is clear glass. This will give the blue positive.

Filters already adjusted can be obtained from most makers of panchromatic plates, and it is advisable to purchase the filters from the maker whose plates you decide to use.

After carefully focussing firmly clamp the camera on its stand, so that no accidental shifting of the position of the image can take place while shifting the filters and plate holder. Having exposed the plates behind their respective filters, the plates should be marked in some way—in the dark-room of course—so that when developed you will know which filter was used for each particular plate. In the author's own practice he always marks on the corner of the plate, I for the red filter, II for the green filter and III for the blue filter. The plates are always exposed in this order. Exposure should be calculated by a meter and should be full so that details in the shadows are recorded. Exposure varies according to the filter being used, and makers of panchromatic plates always include in their box of plates a card showing the various ratios of increased exposure required for each filter. The plates should be developed together at one and the same time, and the aim of development should be to produce fairly soft negatives. Hard negatives are apt to render the resulting print somewhat hard and crude in colour.

There is no difficulty in producing these three constituent negatives, provided you remember that the size and position of the image on each plate must be identical, and all three negatives practically of the same density. From these three negatives, three bromide prints are made, either by contact or enlargement. If enlargements are made, the greatest care must be taken that no alteration of the focussing takes place between changing each negative, and that all three negatives are inserted in the carrier of the enlarger in the same way.

JAPANESE PEONIES. FREDERIC G. TUTTON, F.R.P.S.

As bromide paper has a liability to stretch during wetting, it is advisable to have the bromide prints with the grain of the paper running in the same direction, so that, whatever stretching takes place shall be all in the same direction. To this end the writer recommends that the bromide paper be purchased in the roll, and the three pieces of paper required all cut in the same direction. Any good make of bromide paper will answer and the semi-matt variety gives in the writer's hands the best results.

A trial exposure must be made from the negative exposed through the green filter, or the red printing negative, and the exposure that gives the best results, i.e., a good depth of density and gradation, must be given for each of the other two negatives, so that the three bromide prints shall be practically identical as regards their appearance of depth, &c. It is, of course, impossible to give exact data, but the writer finds that with a soft negative, using a 16 c.p. lamp at 4 feet distance, and an exposure of about 15 seconds, developed with

Sodium Sulphite	48 grs.
Potassium Bromide 5% Solution........	10 drops
Amidol	4 grs.
Water	2 ozs.

at 60 degrees F. for about 2½ minutes gives the best density for producing the best colour result.

It must be remembered that the same length of time in the developer must be given for each bromide print, and fresh developer must be used for each set of prints, otherwise, it will be found that towards the end of a batch of prints, the depth will be somewhat flat and dull, and degraded colours result. Eight ounces of the developer will be found just about right to complete three sets of 6½ x 8½ prints.

To a great extent a good colour print depends upon the bromide prints being perfect, and—unless one decides to use the "Dyeing Method of Colour Intensification" as worked out by the author—it is advisable to get these bromide prints as perfect and as free from fog as possible. The flatter the bromide print, the muddier the resultant colour photograph, the cleaner and brighter the bromide prints, the cleaner the final result.

During printing always mark on the back of each print a

PECONIC BAY. Wm. Elbert Macnaughton.

big "R" for the red print, "Y" for the yellow and "B" for the blue print. This will save future trouble as to which print is for a particular colour. It is now necessary to prepare the three pieces of carbon tissue, viz., trichrome red, trichrome yellow and trichrome blue, and the following two concentrated stock solutions should be made up.

A

Potassium Bichromate	½	oz.
Potassium Ferricyanide	½	oz.
Potassium Bromide	½	oz.
Water	20	ozs.

B

Glacial Acetic Acid	1	oz.
Hydrochloric Acid	1	oz.
Formaldehyde 40% Solution	22	ozs.

or, the above can be purchased already prepared from the Autotype Company, or their American agents, George Murphy, Inc., New York, in which case the quantity in the "A" stock bottle purchased should be diluted with an equal volume of water.

For working use the two baths are made as follows:

A

Stock solution	1	oz.
Water	3	ozs.

B

Stock solution	¼	oz.
Water	8	ozs.

The bromide prints are first soaked in cold water until limp, and then laid on a piece of glass with the print side upwards, the glass being larger than the print so as to facilitate handling. All three pieces of glass with their respective bromide prints should be laid level and in the order it is intended to work, say yellow print first, then red and last blue. It is also advisable that a thin film of water remain on the surface of the print, as this will greatly reduce the chances of pinholes in the final carbon print.

A piece of the yellow carbon tissue, cut about ½ inch larger than the bromide print is taken and immersed in the "A" working bath for about 4½ minutes. Take care that all bubbles are

removed from both back and front of the carbon tissue. At the end of this time, remove from the bath and holding by one corner allow it to drain for exactly 15 seconds, then immediately immerse in the "B" working bath for exactly 20 seconds. At the end of this time, the tissue is removed and carefully placed, gelatine side down, upon the bromide print on the glass marked "Y," and well squeegeed into contact with a flat squeegee. Remove the colour sheet together with the bromide adhering to it from the glass and place between waterproof paper and put under pressure between blotting boards and one or two books, or between a piece of patent sheet glass.

Care must be taken that once the sensitive carbon tissue is laid on the bromide print no movement takes place. If the tissue is held at both ends and then gently brought down upon the bromide paper on the glass, and the fingers of the left hand placed upon the back of the tissue, squeegeeing can then be done without fear of movement. It is advisable that at first this part of the process be practised with two pieces of plain paper, and continued until the worker can squeegee one piece of paper over the other without the least movement.

Next a piece of the red carbon tissue, ½ inch larger than the bromide print is taken and passed through the two baths for exactly the same length of time as for the yellow, then removed from the baths and laid over the bromide print on the glass marked "R" and well squeegeed into contact. Finally a piece of blue carbon tissue cut ½ inch larger than the bromide print is treated in exactly the same way, and well squeegeed into contact with the bromide print marked "B." Note that the "A" bath can be used over and over again, but the "B" bath should be renewed for every set of carbon tissue.

The colour sheets in contact with the bromide print should remain under pressure for at least 15 minutes, when the bromide prints which are bleached by the process, can be removed from the carbon tissue and placed in clean water, and the carbon tissue squeegeed down to a temporary support previously prepared. This temporary support is a piece of thin sheet celluloid of about 1/16 inch in thickness, and about 1½ inches larger than the carbon tissue. This temporary support can be obtained from most photographic dealers. To prepare this support, a few drops of

A SOMBER WINTER'S DAY. P. F. SQUIER.

Pure Resin	360 grs.
Beeswax	120 grs.
Rectified Turpentine	10 ozs.

is poured on one side, and then spread over the whole surface with a soft piece of fluffless cloth and lightly polished with another dry piece of cloth. The three temporary supports should be prepared at least one-half hour before operations are commenced so as to give the turpentine a chance to thoroughly evaporate.

The respective carbon tissues are passed through a dish of cold water and placed with the gelatine side on the waxed surface of the temporary support and thoroughly squeegeed into contact with a flat squeegee, giving a final squeegee by placing the temporary support between blotting paper and squeegeeing with a roller squeegee. When each colour sheet is in contact with its respective temporary support, they are placed between blotting boards and put under pressure for at least one-half hour. This length of time is important so as to get the expanded gelatine to attach itself to the waxed surface so as to prevent subsequent frilling during development. At the expiration of this time, development is carried out in exactly the same way as you develop an ordinary carbon print.

A bowl of hot water of a temperature between 100 and 105 degrees F is taken and the yellow tissue on its temporary support is immersed therein. After about one minute, it will be noticed that some of the yellow pigment is oozing out round the paper from between it and the support. While still under the water, gently lift one corner of the paper base and giving a steady pull, pull off the paper from the waxed support, leaving what looks like a mass of yellow pigment. Carefully note that the paper base should be removed from the temporary support *under* the water. The yellow gelatine not affected by the bromide print is gradually washed away by gently laving the water over its surface, or by gently moving the support about under the hot water. When all the unaffected gelatine has been removed, which takes about 5 minutes, the temporary support, now holding an image in yellow pigment, is immersed in cold water for a few minutes and then hung up to dry.

Exactly the same procedure is gone through with the other two supports, using the red one first, and then the blue. It

is important that the temperature of the water should remain about the same before developing each colour tissue, and a thermometer should be an essential part of the working outfit. If the temperature varies it will be found that the three gelatine tissues will have stretched unequally and so correct registration will be difficult or impossible.

When dry, the carbon images have now to be transferred to a white and final support. In the author's practice, he has found the "fine white smooth" made by The Autotype Company, gives by far the best result in this process, and a piece, cut larger than the images on the temporary support, is taken and placed in cold water for about 30 minutes. The temporary support holding the yellow image is also immersed in cold water for about 10 minutes, when both supports are transferred to a solution of 1% gelatine for about 5 minutes. The two supports are then withdrawn together with the gelatine surface of the final support next to the yellow image on the temporary support, and the two well squeegeed together and hung up to dry.

After drying the two supports will come apart quite easily, the final support now bearing the yellow image. The yellow image should always be the first to be laid upon the paper, as this colour being the most opaque would prevent any other colour from showing through if this order were reversed. The red positive has now to be superimposed over the yellow, but before proceeding to transfer the red tissue, it is necessary that all traces of the wax that held the yellow tissue on the temporary support be removed from the yellow positive by rubbing the positive over with a swab of cotton wool saturated with clean benzol. When the benzol has evaporated, the yellow positive and the red positive on the temporary support are placed in cold water for about 10 minutes and then transferred to the gelatine solution for another 5 minutes. At the end of this time, the two images are roughly superimposed while still in the gelatine solution, removed together, and placed upon a sheet of blotting board with the temporary support uppermost, when the final adjustment of the red image over that of the yellow is carefully carried out, so that the outlines of the two positives exactly coincide with each other, carefully squeegeed together and hung up to dry.

When dry, the two supports are pulled apart, and the wax

adhering to the now red-yellow image is removed as before with benzol. The blue positive is now superimposed over that of the red-yellow in exactly the same way and when dry, and the two supports pulled apart, the wax is again removed from the now completed colour photograph, which will be seen in all the beauty of natural colour.

It will be noted that the print has a shiny surface which is rather distracting to its beauty. This can be removed by immersing the whole photograph in cold water for 10 or 15 minutes and then drying in the ordinary way, when it will be found to possess a semi-gloss that now rather adds to the beauty of the print. Trimming and mounting is carried out in the same way as for an ordinary monochrome print.

The temporary supports can be used over and over again by cleaning them with benzol after use and rewaxing, while the bleached bromide prints after washing for about one-half hour in running water can be redeveloped with the Amidol developer and used again.

The above operations may sound more difficult than they really are. The difficulties are easily overcome with a little practice, and when once a fair start has been made, and the subject thoroughly grasped, there are few who will have any desire to abandon this fascinating branch of photography, and the writer trusts that this article may be the means of inducing many others to produce colour photographs.

JANE. ROY H. HEISER.

A METHOD OF WORKING THE GUM-BICHROMATE PROCESS

By J. HAROLD LEIGHTON

AMONG the many photographic printing processes there is none more fascinating than the gum-bichromate. It lends itself especially to pictorial work, and has the great advantage of being cheap. There are no doubt many ways of working the process, and I should imagine every worker has his own particular way of working according to the results he wishes to obtain. The method I am about to describe is for single printing only and for obtaining rich blacks and sepias.

The materials required are not many, and it pays to get the best to begin with. Almost any kind of paper will do except those with a very highly finished surface, I find drawing papers with a fairly smooth surface such as Joynsons or Whatmans are the best, Michallet is the easiest to coat, but the lines on it are a disadvantage at times. Two brushes are required, one a thick hog bristle for putting on the pigment and a badger hair softener for getting the coating even, though after a certain amount of practice you will find you can do everything with the hog hair brush.

The most suitable brush for the purpose is Sinclair's London.

Pigments required are drop black, burnt sienna, and raw umber in powder form, and with these you can make any shade of sepia you want. They can be obtained from any color man, but mind they have been finely ground. For coating solution make the following stock solutions

1.	Gum arabic	5 oz.
	Water	8 oz.

Dissolve the gum in cold water and strain through muslin to get rid of any impurities, then add 20 drops of pure carbolic acid. This will keep good for some months.

2. A 10% or saturated solution of potassium bichromate. This keeps indefinitely.

To prepare the coating solution take 1½ scruples of pigment

SUNLIT YARD. J. Arthur Lomax, F.R.P.S.

put it in a mortar and pour onto it 2 drams of the gum stock solution, mix well and then add 4 drams of the bichromate solution mixing well all the time. The solution is now ready and the paper may be coated, this is the only difficult part of the process, but after a little time becomes quite easy.

Take your sheet of paper, the size I generally use is 11½ x 14½ from which I can cut four half plate pieces, but whatever size you use you must allow a margin of one inch all the way round, as it is impossible to coat the surface evenly up to the edges. As a rule I pin a sheet of blotting paper on my darkroom wall, and pin the paper I am going to coat on the top, then taking my brush with a fair amount of pigment proceed to cover the paper as quickly as possible, first with cross strokes then up and down strokes getting the surface as even as possible, then I take my badger hair brush, and go over the surface just with the tip in order to take out any of the previous brush markings. The paper should look gray or light sepia as the case may be, but not a dead black or sepia.

If the first sheet looks very black you will know that there is too much pigment in the solution, and you must let it down with some more of the bichromate solution. Hang the paper up to dry in the dark, and when quite dry cut to the size you require, store in a dark place, and if you wish to keep for some time, put it under pressure, or into a calcium box. I have kept paper for six weeks and found it quite satisfactory.

Printing. You will find that you have great latitude in printing, and it is advisable to over-print a little, an under-printed print is of no use at all. Place the paper in the printing frame with the pigmented side next the film and print by daylight, not direct sunlight, as there is no visible image it is necessary to use an exposure meter. I find Wynne's very satisfactory, and as a general rule I print twice as long as I should a P. O. P. print. There is one way of telling if you have printed far enough, and that is by holding the print near a bright light if a faint image is visible you will then know that it is ready to develop.

When printed take your paper out of the frame and place face downward in a dish of cold water, being careful that there are no air bells either on the back or front. If correctly printed it should develop up in anything from twenty

to forty minutes, though a very much over-printed print may take hours or even days to develop up. In the case of the latter as a rule the finished print is much more granular, and not so pleasing as a correctly printed and developed print. There is one very important point to note in development, and that is you must not take the print out of the water when it looks as if it is correctly developed, but let the development continue somewhat further, for the prints always dry darker, and if taken out too soon the print will be more or less spoiled.

When development is complete take the print out of the water and place it on a piece of glass, you can now work on the print, and with care put in clouds if necessary, or take out such objects as telegraph poles, mill chimneys, or other unsightly objects. Be very careful not to touch the surface of the print with your hand, as the surface is very tender. When dry you can work on the print with Conte crayon or charcoal. The print is now finished and can be mounted in the ordinary way, white mounts are the most effective.

With regard to the pigments I find they vary a great deal, and you may find that 1½ scruples is too much, in which case add more of the stock solutions or reduce the quantity of pigment. If artist's colors are used you will find that ½ a scruple instead of 1½ scruples will be ample.

GRAY DAWN. W. R. MAC ASKILL.

THOSE ELUSIVE BROMOILS

By FRED T. USHER

THIS is not my phrase. It crystalises a prevailing impression about one of the most fascinating and beautiful processes known to photography. The average bromoiler seems to have a rooted belief that there is no brand of paper which can be relied on to give a bromoil every time. He succeeds once, fails the next time, and straightway howls about the shortcomings of the bromide paper manufacturer. "If," he says, "a firm offers for sale a product labelled 'bromoil paper,' it ought to give a bromoil without any possible chance or doubt." This sort of talk is not by any means confined to beginners. There are old hands who condemn the manufacturer whenever they fail to ink-up a bleached print.

I hold no brief for any manufacturer, but I have a solid conviction that in forty-nine cases of failure out of fifty the fault lies with the worker, and not with the manufacturer. As a matter of fact I am satisfied that any bromide paper which is plentifully coated with gelatine will produce a bromoil if it is given a reasonable chance. Some brands it is true will respond to the inking-up process more amiably than others, but all will respond. I am not discussing the production of exhibition prints; these depend entirely upon the skill and taste of the worker, and the manufacturer is not concerned.

It is not necessary to put the worker through a course of chemistry to convince him that gelatine is an unstable quality. He finds that out in ordinary practice. Now, bromoil depends upon gelatine and especially upon the condition of it. Whatever sort of gelatine we are dealing with on a sheet of bromide paper, it must be brought into proper condition, otherwise it will not make a satisfactory bromoil print. The gelatine may be hard, or it may be soft. Hard gelatine may be softened by long soaking, or by raising the temperature of the water in which it is steeped. Soft gelatine can be preserved from destruction by working it in cold water, but before attempting

SOUTH AISLE, DURHAM CATHEDRAL.
Illustrating article "Those Elusive Bromoils," by Fred T. Usher.

to ink-up both sorts of gelatine must be brought to one condition.

Personally I prefer to use cold solutions always and rely on soaking to put the gelatine in good humour. As a rule I use the following brands of paper: Barnet Cream Crayon smooth (natural surface), Barnet smooth ordinary, Barnet Tiger Tongue (very rough), Wellington Smooth ordinary, Wellington Extra Rough, Wellington Bromoil paper, Kodak Royal. When these brands are not handy I take any other papers suitable to the subject in hand.

With regard to bleachers all the known formulae work very well, but for ease and certainty the Sinclair Bleacher seems to me to meet the needs of the man in a hustle, while the following will be hard to beat in all-round work:

Copper Sulphate	80 grains	or	5 grammes
Sulphuric Acid	5 minims		5 drops
Potassium Bromide	80 grains		5 grammes
Potassium Bichromate	7 grains		0.4 gramme
Chrome Alum	16 grains		1 gramme
Water to	20 oz.		500 c.c.

This formula is not my own; it appeared in an earlier edition of the "Wellington Photographic Handbook." It works best when freshly made.

I will relate an experience which set me experimenting and eventually fixed the opinions which I have set out above. Wishing to make a bromoil print of the head of a tame fox with a special view to the correct rendering of the fur, I selected a sheet of tinted bromide paper which was reputed to be practically useless for bromoil work. I liked the color and texture of the paper, and so gave it a trial. Knowing the gelatine was very hard I let the bleached print soak for twelve hours and then tested it. It declined to take the ink. I, therefore, returned it to the water bath and let it rest for twenty-four hours. Its condition was then such that it inked-up with perfect ease in fifteen minutes.

As a result of the experiments which followed I adopted the following system: The bromide print is soaked until quite limp; it is then bleached until the image is gone and for as long again; it is then washed in changes of water until the water runs off clear—about five minutes. Next it is

AN ENGLISH WATERWAY.

Illustrating article "Those Elusive Bromoils," by Fred T. Usher.

dropped for roughly five minutes in a pint of water into which an eighth of an ounce of strong sulphuric acid has been stirred. After a few more changes of water the print is soaked in plain hypo solution (strength immaterial) until fixed. Finally it is washed and dried.

Before pigmenting the bleached print is soaked for fifteen minutes in water at the temperature of the room in which the work is to be done. Usually it inks-up at once. If it does not respond to the first touch of the brush it goes back to the water and remains there until it is in better mood.

All this presumes that the original bromide print is a good print. Alas, the workers who make perfect prints are not so numerous as they ought to be. Almost any exhibition will emphasise that sad fact. A good print is one that is correctly exposed and properly developed and, therefore, sound in color.

Prints that are under-exposed and over-developed are not good, neither are prints that are over-exposed and under-developed and pale, or muddy, or flat. In a temperature of 60 to 65 degrees, using an average developer without bromide, a bromide print that stops developing at the end of two minutes comfortably will be sound in color and will make a satisfactory bromoil. It should be so exposed as to give the right sort of image in just that time, that is to say, the high lights should be bright, clean, and full of detail, while the shadows should be rich and intense in color. Anaemic prints in washed-out gray may suit the worker who likes to tickle the surface of the paper, but they will not be easy to work, neither will they give that liquid depth of shadow which is the hall-mark of quality in a bromoil print.

If anyone says this system of working is "too much fag" my reply to him would be: "Change your process." Anything that is worth doing at all is worth doing well, and if there is anything better worth doing well, photographically speaking, than a good bromoil, I have yet to make its acquaintance.

SALINAS RIVER. LOUIS FLECKENSTEIN.

GILL & SON.

EXPRESSION IN PORTRAITURE

By T. W. KILMER

IF I were asked as to what I considered the most valued attribute in the make-up of a photographic portrait, I should unhesitatingly say expression. You may light your subject ever so nicely and according to all the accepted rules of lighting, you may compose your 8 x 10 rectangle so that it agrees with all the theories of composition, yet, if the finished result does not *look* like the sitter, all your labor will have gone for naught, because the fellow and his friends will say, "It is not his expression, it does not *look* like him."

Many people assume a strange expression the moment they face the camera. This is purely psychological. They feel that they *must* try to look as usual, and the mere effort of trying turns their expression into anything but a natural one. Some people always take a good portrait; they seemingly cannot help it. I have a friend who invariably has a good portrait any time he sits, and it is really a pleasure to make negatives of this man, because his expression is never a strained one. I

HIS FIRST RIDE.

Illustrating article "Expression In Portraiture," by T. W. Kilmer.

have had some sitters who would insist upon my giving them a mirror so that they could assume some expression that their wife always liked; it is needless to say that the negatives so taken never proved successful.

If a person tries to look unconcerned, he never does look so in the finished print. Just as soon as your sitter begins to *try* to *help* you, it is almost useless to make more exposures; they will be failures.

One of the first things that many men sitters ask me, is, "Now, how do you want me to look?" or "What shall I do now?" I tell them that I do not want them to *do* anything for me at all. Get them to talk, especially about things that interest them. It is always my custom when a friend comes in to sit for me to first find out in some way what are his hobbies. Men have all sorts of hobbies, all the way from entomology to comparative theology. Get them talking about their hobby, focus on them while they talk, and all at once, say, "Now, just hold that a second,"—and before they know it, their *expression* has been recorded on the sensitive film.

The time of day seems to make quite a difference in expression. If your sitter is a very active man, say, a stockbroker, do not take him after a hard day's work. Grouchy people, I find, are best taken after a hearty dinner. Portraits of nervous, excitable men are best made an hour or so after breakfast. Use plenty of light in all cases, and as fast a film or plate as possible. Old people cannot hold still for a great length of time, so make your exposure short. Many men will assume a more normal expression if you tell them to look at you, instead of into the lens; there is something very embarrassing to some people to stare vacantly into a wide-open lens.

Expression to my mind is the keynote of all successful portraiture.

PORTRAIT OF MISS R.

Illustrating article "Expression In Portraiture," by T. W. Kilmer.

THE IMPORTANCE OF THE BEGINNER

By A. H. BEARDSLEY

DURING the past year it has been my pleasure, and my privilege, to meet and to talk with photographic manufacturers, dealers and camera-club members who represented the very best and the very latest photographic thought of the day. As a result of my experience, I am led to say that we are all inclined to overlook one of the most important factors in the future growth and prosperity of photography—the beginner. At once, my reader may remind me of the excellent beginners' departments in the leading photographic journals, the many moderate-priced cameras made especially for the beginner, the plethora of books and pamphlets for the photographic education of the beginner, and a number of other very helpful things that are being done for the beginner. Yes, I admit all this and I rejoice that so much is being done; but is it enough? Again, the reader may come at me with the question, "Well, what more should be done or could be done?" In reply, let me ask a question, "What is the photographic manufacturer, dealer and camera-club member doing for the beginner's morale?"

Before attempting to answer that question, let us look things over with a sincere desire to avoid any injustice, and with the hope that a friendly discussion may be of service to all concerned. As I have admitted gladly, much is being done for the beginner along certain lines. We give him cameras, instructions and many "dont's" and bid him go forth. What happens when he comes back? Without wishing to censure unjustly, I will say, from my own experience, that many times the very ones who started the beginner off photographically will not see him through to success.

If we are honest with ourselves, we must admit that the struggles of a beginner have the effect, sometimes, of making those of us who "have arrived" feel a wee bit superior. To be sure, we wish to help and to do all we can; but often we are apt to do it in a way that fails to win the confidence or

PARK ROW, NEW YORK, ON A WET DAY. WM. A. ALCOCK.

gratitude of the beginner, because of that bit of ego which bobs up whenever we think we can do something better than our neighbor. It is human and all that; but does it really help the beginner? It is so easy for the father to forget that he was a noisy youngster when he becomes irritated by his young son's racket. The mother, too, may have forgtten that she was somewhat of a flirt in her day, when she reprimands her "boy-crazy" daughter. So, in photography, those who feel sure of their own success to-day may forget all too soon that once they, too, were beginners and that they, at times, were very glad to get the kindly help of a friend. To forget is not good business, commercially or spiritually.

As I have said, the leading manufacturers are now placing cameras, lenses and equipment within the beginner's technical and financial reach. At great expense, they are supplying free of charge well-printed, clearly written and beautifully illustrated catalogues, booklets, instruction-books and other helpful information. Many manufacturers maintain special departments for the service of those who use their products and desire advice when in difficulty. It seems to me that the manufacturers cannot very well do more than they are doing to help the beginner to photographic success. In fact, the manufacturers are somewhat in the position of the old farmer who said that he could lead his horse to water, but he could not make him drink. The makers of cameras and lenses can make the goods and can get them to the beginner, but they cannot compel the beginner to use these goods successfully—that is up to the beginner and those who should befriend him.

The photographic dealer comes into closer contact with the beginner than the manufacturer usually does, and the dealer can do much to "make or break" the beginner in photography. It is to the dealer that he goes for his first camera. It is to the dealer that he brings his first plates or films and awaits the verdict with almost feverish interest. It is at this critical time in the beginner's career that a dealer can help him along to photographic success; or hinder, if not discourage him entirely.

It is not always *what* is said but *how* it is said that makes the difference. Let me illustrate. There is the young, well-meaning, photo-counter clerk who lacks experience technically; there is the older clerk who thinks that he and his opinions

THE HUSBANDMAN.

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O. C. Reiter.

are "the law and the prophets" photographically; there is another who is "just filling in" to make a little more money on the side, and there is one who chews gum and considers it almost beneath his or her dignity to wait on a customer. Whenever the beginner faces any or all of these types of clerks, he is very near the abyss of photographic oblivion—the least thing is likely to cause him to lose his footing and consign things photographic to the evil one.

On the other hand, there is the quiet, courteous, well-trained salesman who shows a real interest in the beginner and his problems. Moreover, this type of salesman "knows his business," and can tell the beginner exactly why this or that failure was made and how to remedy it in the future. A friendly relationship springs up and the beginner grows in photography, and the dealer makes a profit on the goods sold and, best of all, the demand continues because his customer is making a success of photography. I cannot repeat it too often that it is the *successful* amateur or professional photographer who maintains the photographic industry. Let us remember that the successful photographer is made from the *successful beginner*.

Why is it that so often we refuse to take the beginner in any art, profession or sport seriously enough to really help him? Of course it is not always so; but I venture to say that, if the truth were told, most "arrived" camerists would plead guilty to smiling indulgently when viewing the pictorial efforts of the average beginner. To be sure, we must admit that the beginner in golf, or tennis can furnish much amusement to the veteran player, and that the "messy" prints and negatives of the beginner in photography are often a "joke" to the successful pictorialist. Nevertheless, speaking frankly, is this the way to really help the beginner, to increase interest in photography, to recruit the number of camera-club members? I know of several average amateur photographers who resigned from their camera clubs solely because they "got tired of being kidded all the time," and because of the superiority shown toward them by some members who had prints hung at the London and Pittsburgh Salons.

When I asked the "arrived" pictorialists of international fame why they did not do more for the beginner they said that they had tried to be helpful, but that the average new

club-member failed to take the necessary interest, and would not devote the required time to mastering the fundamentals. No doubt this is true in a number of cases. After further investigation, I found myself in the position of the inn-keeper in "Silas Marner" who to preserve order when two guests became somewhat heated would step between them and smooth them down by remarking, "Gentlemen, you're both right and both wrong and the truth lies a'tween you." Even so, in this problem of the beginner, there is some justification for the remarks made to me by those who know whereof they speak.

Well, let us grant that the beginner's criticism of the experienced camerist is justified, and that the defence of the veteran pictorialist is justified—what have we gained? "A house divided against itself cannot stand." If we do not give the beginner the full measure of our interest and support, and if the beginner does not give his full measure of interest and sincere effort, where will our camera clubs and salons be within the next ten or fifteen years?

It is all very well *now* where a camera club can boast of five or a dozen real workers who increase and maintain the reputation of the club; but who will take their places? There may be forty other members of the club; why do they let five or a dozen win all the honors? That is a question that many executive committees would like to have answered. If these forty other members do nothing now, to supplement the work of those who are active, what will these forty be doing ten years hence? You say, "but these other members may not have the ability to take the places of the real workers"; very well, why not encourage and develop the beginners who may possess the required artistic and executive ability?

The finest and most efficient military unit today would be of little service in one year's time if the gaps made by sickness, transfers and death were not filled up promptly by recruits trained for their places in the ranks. Camera clubs will have to recruit their strength from members now inactive, or from beginners who enter the field with the enthusiasm of youth and the desire for pictorial honors. Unless this is done and done speedily, a number of camera clubs will be non-existent in 1934.

Now what I am trying to lead up to is the morale of the beginner, and the importance of maintaining it if we would

THE VASE. FRED WILLIAM CARTER.

increase the numerical strength of camerists in this country. In my opinion, we cannot afford to belittle the humble efforts of the small boy with his Brownie camera, nor the more "advanced" work of his sixteen-year old sister. As for the average grown-up snapshooter—much as we may deplore the majority of his "snaps"—he is, nevertheless, promising material from which to recruit our ranks; and helpful interest should replace whatever feeling of amusement or superiority may exist. The question of morale is a vital one when one of these snapshooters really tries very hard to meet the requirements, and is obliged to meet the amused, and sometimes rather unkind, criticism of those who have forgotten their own tyro-days.

At such a time, a word of appreciation for the effort, a kindly suggestion or a helpful technical hint will instill the snapshooter with the right morale, and he will go out eager to keep on and to make good. Take my word for it, we will win more recruits to the photographic ranks by this method than by "kidding," ruthless criticism and the display of superiority. Sometimes, it seems to me, that certain camera clubs have no other object in view than to tear their own members' work to pieces under the guise of "pictorial criticism." That word "criticise" is one which I hope may be eliminated some day. To be sure, criticism may be favorable; but most of us assume that criticism is a "picking to pieces," and the exposing to public view of our mistakes and, hence, the word conveys a meaning which—the dictionary notwithstanding—we dread pictorially and otherwise. Perhaps "pictorial comment" would be less harsh than "criticise."

In conclusion, can we not all work together to make the most of the beginner for the sake of the science and art we all love? When he presents his humble offering for our consideration, can we not forget our successes long enough to enter the beginner's place and share with him his photographic problems? And when he asks us to criticise his pictures let us do it with tact, kindliness and sympathetic appreciation of his shortcomings. Let us remember to look for all the good things in the print before we call attention to its deficiencies. In fairness let us give credit for all that deserves our praise.

We should not forget how we felt, perhaps years ago, when

MARIO'S PLACE. H. E. JELTSCH.

we held out our first prints for inspection. Would we have liked to have them figuratively torn to pieces before our very eyes, and not to have received one word of encouragement? The words spoken in the long ago apply here as elsewhere; "he that is without sin among you, let him first cast a stone." Some beginners may not be worth our well-intentioned efforts; but I venture to say that nine out of ten will appreciate the kindly word of helpfulness, will learn to love photography as we do and, eventually, will take our places in the camera clubs and salons of the world.

PORTRAIT—GIRL IN BLACK. RABINOVITCH.

GRANDMA'S LOVE. EM. BORRENBERGEN.

BROWN AND BROWN BLACK BY DIRECT DEVELOPMENT

By ANSON HERRICK

THE obtaining of a sepia tone by either one of the redevelopment processes, or by the hypo-alum method, presents no particular difficulty and the results in many instances are, provided the original exposure and development were suitable, quite satisfactory. The resultant tone is, however, fixed within narrow limits, although I have used a modified hypo-alum method which did permit of a quite pleasing brown black. At best they entail a secondary operation, and I much prefer a direct development method not so much on account of simplicity, as on account of the far better results.

Warm tones by direct development is by no means new. The use of pyro and hydrochinon are I believe fairly well known, and their uncertainty of action has unquestionably produced many a generous flow of expletives. I have used hydrochinon with beautiful results, and with a degree of relative certainty, that leads me to believe a careful study of its action would enable the development of a procedure which would be fully definite.

It is extremely slow in its action which I found such a drawback that I practically abandoned its use. Then acting upon a suggestion of John Paul Edwards, I began experimenting with the use of adurol, and finally developed a formula that has given me the most excellent results, both in rich browns and brown blacks, and into merely warm blacks. It may be that the formula (which quite apparently is a modification of the standard M.Q. formula) is not new, but I have never seen it referred to in the usual photographic publications, and believe accordingly that it may be of interest to the readers of the *Annual.*

The formula is as follows:

Adurol	(Hauff)	25 Gr.
Sodium Sulphite	(Anhydrous)	190 Gr.

OCEAN. **Y. Malony Kumazawa.**

Hydrochinon	....	40 Gr.
Sodium Carbonate	(Anhydrous)	200 Gr.
Potassium Bromide	(Saturated Sol.)	15 Min.
Water	....	20 Oz.

Adurol is a developer intermediate in character between the short factor developers such as pyro and hydrochinon, and those of long factors as metol, rodinol and amidol. In action, and in results, it resembles hydrochinon, so that its use in combination with that developer is not usual. I am not sufficiently versed in the reactions of photographic chemistry to know why the combination works as it does. I do know, however, that it has worked well for me.

In use the developer should be between 65 and 70 degrees. The print should be exposed for three or four times as long as would be required for a normal development, or so that the image begins to appear in about 30 seconds. The image first appears as a reddish brown which gradually changes to rich brown, and then on to a warm black if development be carried to final completion.

It is here that we have, according to my experience, the only difficulty and uncertainty. If the print is so exposed that development must be fully carried out in order to sufficiently build up the image, no other result than a warm black can be obtained. If the exposure has been so long that the shadows begin to block up inside of three to four minutes, then the brown tone will be uneven being darker in the shadows, and by the time the tone has evened up we have merely an over-exposure, too gloomy for use regardless of the richness of tone.

Properly the exposure should be such that the rich brown tone is reached in between three and four minutes.

As almost every negative will vary somewhat, at least, in density, it is of course impossible to give any specifications for exposure duration. This must be empirically determined. My own negatives have a tendency towards thinness, and with a 250 watt unmirrored light, condensers and an F/6.3 lens my own exposures will vary from 20 seconds to over a minute. The type of negative suited to this developer is one having no excessive contracts and which has at least a tendency towards softness.

As the immediate stoppage of development is essential a short stop bath should be used. Fixation in the usual manner, of course, follows.

Like all warm tone developers the action changes as the developer becomes oxidized though not as rapidly. The first three or four prints have to be carried to a brown black, owing to the fact that the tones of the shadows deepen more rapidly than the high lights and half tones. After three or four prints, unless the negative is quite contrasty, it will be found that the tone will change with evenness and, if exposure be correct, development may be stopped at any stage from a brown, as light but richer than the sepia of a re-development, on to a warm black. In actual practice, as a rule, one is usually (and here I refer to the amateur) printing from a number of negatives, and will wish prints of only a few in brown.

At least that is my situation, and I merely make my first few prints of subjects which I wish to produce in black and then take up those which I wish in brown or brown black. Accordingly the fact that brown tones cannot be obtained from the first few prints is not a great hardship.

It is apparent that the process which I have sketched is not sufficiently certain to enable the convenient production of a number of prints of exactly the same tone. I have found it of great value wherever the subject was such as to require a good rich brown, or a particularly pleasing brown black for its rendition. I have produced tones so far superior to anything possible by re-development or by hypo-alum as to fully justify my recommendation of the formula. To those who have an experimental bent I suggest the modification of the quantities of carbonate and bromide. The quantities of these chemicals shown in the formula were determined after considerable experiment, and have given me the best results. With different negatives and light some modification may be required.

I should also add that all of my work has been done on Artura Carbon Black Grade E. I am confident that the same results would be produced on bromide paper, but suggest diluting the formula up to 25 or 30 ounces of water and increasing the potassium bromide to 20 minutes.

CALIFORNIA COTTAGE. ANSON HERRICK.

GETTING EVERYTHING IN FOCUS

By HERBERT WHEATON CONGDON, M. A.

TOO bad that Bill and Harry are out of focus; but they were close up and I wanted to get the background sharp."

But you could have got both background and boys in sharp focus if you had only had and used depth tables calculated for the lens of your camera. This story is to tell you how.

Of course, if you have a plate camera with a ground-glass back you can do it by cut-and-try methods, but with the ordinary hand camera, it is a matter of setting stop and range on the focussing scale, the question being what stop to use and at what range the focus should be set.

First, let us define what we mean by a sharp or clear picture, for that is a relative term. If you are looking at the movies from the pianist's seat they do not look as sharp and clear as they do half-way back. Similarly, many a little snapshot looks all right until it is enlarged, when it looks fuzzy.

The image on your print is really made up of "circles of confusion" and when they are large enough to be noticeable the print is fuzzy; you see the grain as it were. Otherwise, the picture looks sharp and clear. This is apparent in any picture that is enlarged enough, as is a lantern slide when thrown on a screen fifteen or more feet square. In a large print, say 11″ x 14″, a "circle of confusion" of 1/100 inch gives the effect of a sharp print, while in a vest-pocket Kodak print it may have to be as small as 1/300 inch to make a sharp-looking print.

For purposes of illustration suppose we have taken a picture looking down a street with an old fashioned board fence alongside, the sort that Tom Sawyer whitewashed. The boards are about ten inches wide with a couple of inches between them, so we may assume there is a board for every foot of fence. Your camera is a post-card size and the stop is F/11, and you have set the range for twenty-five feet. In the resultant print the board twenty-five feet away is clear and

BEFORE THE TEPEE. SOPHIE L. LAUFFER.

sharp, while that three feet away is fuzzy, as is the end of the fence one hundred and twenty-five feet away. Somewhere in between these limits the boards look to be in sharp focus; they are clear enough for your purpose. If you enlarge this as on a movie screen, fewer of these boards will look clear, but for all practical purposes the board thirty-five feet away and that only nineteen and one-half feet off will look as distinct as that twenty-five feet away. In other words, your lens when set at F/11 and twenty-five feet range has a "depth of focus" of fifteen and one-half feet.

Depth of focus is the same for the same aperture and range of any lens of like focal length, whether it be the one that comes with a Brownie or a high-priced anastigmat. The shorter the focal length, the greater the depth of focus at a given aperture and range. That is why the movie pictures show near and distant objects equally sharp, while your post-card size camera will not and cannot; and incidentally, that is the chief argument for the miniature size cameras. In passing it may be said that for good perspective (freedom from distortion) the focal length of the lens must be in proper proportion to the size of the plate, and a short-focus lens, therefore, requires a small camera if the pictures are to be free from the distortion one often sees in banquet pictures: for example, where the unfortunate people near the edge of the picture have amazingly odd-shaped heads!

Depth of focus is increased by stopping down the lens. A picture taken through a pinhole has a depth of focus not approached by any ordinary lens, but on account of the tiny aperture the exposure is lengthened correspondingly. That gives us the key to our problem of getting Bill and Harry in sharp focus in the foreground as well as the hills in the background. Study your depth of focus table and set your camera accordingly.

In making up such a table for your camera, you must first decide on the "circle of confusion" that fits your needs. In a large camera 1/100 inch is all right. In a vest-pocket negative from which you intend to make enlargements of considerable size, or from which you intend to make lantern slides by contact, a circle of confusion as small as 1/300 inch may be needed to get the results you are after.

Next, you must know the focal length of your lens. This

RONAI DENES.

is given in the description of your camera printed in the catalogue, or if it is a high-grade lens it is engraved on the barrel together with the maker's name and other data. If the focal length is given in the metric system you must translate it into ours, as the "ranges" on your focussing scale are all in feet if you have an American camera.

You will require three formulae, the first for calculating the hyperfocal distance for each "range" on your focussing scale, the other two for calculating the near and far points at which the picture will be in focus when set at the given range. As all three of these vary with each aperture, it means quite a lot of figuring to be done; but the results are well worth it. A certain make of American camera has a table of depths attached to the camera bed so as to be in sight when the camera is open for use; you may prefer to transcribe your table on the inside flap of your carrying case, so it is out of the way when not needed but easily accessible for use. Any waterproof India ink or drawing ink may be used for writing the table on tan leather; on black leather the use of white ink seems obvious, but it will not stand rubbing, and the best thing to do in that case is to typewrite the table on bond paper and attach it to the leather with glue, varnishing it for protection.

Now for the formulae. For the hyperfocal distance, "H," square the focal length of your lens and divide by the aperture times the circle of confusion. Or

$$\mathrm{H} = \frac{F^2}{fc}$$

Note in this that the aperture must be expressed in f numbers, as the U. S. numbers are merely empirical, while the f numbers express the ratio of the aperture to the focal length.

The near point that will be in focus when the camera is set at a given range, and when the diaphragm is set at a given aperture, may be found by dividing the product of the hyperfocal distance times the "range," by the sum of the hyperfocal distance and the range; the far point by dividing said product by the difference of the hyperfocal distance and the range. In formula shape this would be:—

$$\text{(a)} \quad \mathrm{D} \ \frac{Hr}{H + r}$$

PORTRAIT OF GARDNER HALE. G. W. Harting.

$$(b)\quad D_1\ \frac{Hr}{H-r}$$

To make these calculations clearer, let us take as an example the 105 mm. Zeiss IC Tessar lens supplied with several of the standard makes of foreign camera in the size 2¼ x 3¼. First we must reduce the focal length, given in the metric system, to inches (see conversion tables in the back of this book) which gives us a focal length (F) of 4.134 inches, a little more than 4⅛ inches, but we might as well work exactly. This lens works at $F/4.5$ for its largest opening and the "ranges" shown on the focussing scale are 5, 7, 10, 13, 20, 40 and 100 feet. We must find the "H" or hyperfocal distance for each aperture of the diaphragm and the depths for each of the "ranges." Let us start with $F/4.5$.

Substituting in the formula $H = \frac{F^2}{fc}$

we get

$$\frac{(17.09)\ 300}{(4.5)\ 12} = \frac{5127}{54} = 95.$$

Note that in a small camera like this we are using a circle of confusion (c) of 1/300 inch; and as our "range" is in feet and the hyperfocal distance in inches we must divide by 12 to get our result in feet.

Now substituting in formulae (a) and (b) we have

$$\left.\begin{array}{ll}(a) & \frac{(95)\ 5}{95+5} = \frac{475}{100} = 4.75 \\ (b) & \frac{(95)\ 5}{95-5} = \frac{475}{90} = 5.28\end{array}\right\}\ \text{range 5 feet,}$$

and so it goes for all the rest. This means that when this particular lens is set at 5 feet range with a diaphragm open to full width that everything is in focus between 4′—9″ and about 5′—3″, a total depth of focus of 6 inches. Now let us take a look at the table and see how it may be used. In this the top row of distances are the nearest points in focus and the bottom row (in bold-face numerals) the farthest points in focus when the lens is set by the focussing scale for the given ranges.

Suppose you are anxious to take a picture of your wife standing by the new sun-dial, with the garden behind her. She is but ten feet away, while the garden hedge with its rose

DEPTH TABLE FOR 105 MM. LENS

Circle of confusion 1/300 inch.

f	5′	7′	10′	13′	20′	40′	100′
4.5	4.75 **5.28**	6.52 **7.57**	9.05 **11.17**	11.80 **15.54**	16.82 **25.33**	28.14 **69.10**	49.00 ∞
5.6	4.69 **5.35**	6.37 **7.70**	8.84 **11.50**	11.10 **15.66**	15.84 **27.10**	26.24 **81.33**	43.27 ∞
8	4.57 **5.52**	6.19 **8.06**	8.42 **12.30**	10.45 **17.18**	14.55 **32.0**	22.86 **159.40**	34.81 ∞
11.3	4.41 **5.74**	5.90 **8.59**	7.90 **13.59**	9.47 **19.41**	13.0 **42.48**	19.43 ∞	27.43 ∞
16	4.21 **6.15**	5.51 **9.49**	7.28 **16.0**	9.0 **25.34**	11.43 **79.7**	16.0 ∞	21.73 ∞
22.6	3.95 **6.79**	5.14 **11.20**	6.54 **21.23**	7.70 **41.64**	9.71 ∞	12.83 ∞	15.9 ∞
32	3.63 **8.0**	4.58 **15.0**	5.70 **40.0**	6.56 **576.3**	7.90 ∞	9.90 ∞	11.73 ∞

trellis is twenty-five feet off. Looking up the nearest conditions in the table, you will set your lens at aperture *F*/16, your range on the focussing scale at 13 feet, and expose to suit your aperture. The result will show the desired near and far objects in focus.

Again, suppose you are on your boat and want to show son at the wheel, with the distant hills in as sharp focus as the boy. Stop down to *F*/32, set your range for twenty feet and make a "slow snapshot." Or you want to make a picture of your dining room, which is thirty-five feet long, your camera being near the end wall and the table, set for Christmas dinner, coming within six feet of the camera, while the tree with the gifts piled about it is at the far end of the room in the bay window. Stop down to *F*/32 and set the focus at ten feet, and everything from five and one-half feet to the bay window nearly forty feet away will be in sharp focus.

From the table one also learns what *not* to do. In a desire to photograph the distant hills framed by your vine-covered porch you have set the focus at one hundred feet, as you usually do for a distant landscape, and have stopped down to 32. When you develop your film you find that the vines,

THE STREET. PETER G. PETRIDIS.

which were only eight feet away, are all blurred despite the small stop. If you had set the focus at twenty feet instead of one hundred, they would have been sharp, and so would the hills and fields.

If you are looking for maximum depth of focus with your little camera, you will keep the diaphragm set at 11.3 and will focus your distant views at forty feet instead of one hundred, and then things only a little over nineteen feet away will be in sharp focus, while if you had set the focus at one hundred feet range everything nearer than twenty-seven and one-half feet would be out of focus.

Calculate your own table to suit your lens, and you will find that a very much larger percentage of your pictures will make good enlargements, *provided* you avoid the besetting and unconscious fault of the majority of hand-camera workers who slightly move or jar the camera in the process of pressing the button.

THEODORE EITEL.

THE ICE FLOE. WARREN R. LAITY.

SURVEYING WITH A KODAK

By C. H. CLAUDY

THE tennis player occasionally finds joy in batting a ball against a wall, although the result is not tennis. The golfer has his putting contests, or plays against Mr. Bogey and has a good time, even if he isn't playing golf. And the photographer can do a lot of things with his kodak besides press the button, and have a very interesting hour doing them, even if he isn't making masterpieces.

Among the educational and interesting pastimes with a kodak, measuring height and distance must be included as both novel and interesting.

As all who have studied "proportion" know, having three sides of an equation, the fourth can be found by a simple sum in multiplication and division. Thus, in the example, "4 is as much greater than 2, as 10 is greater than x" to find "x" multiply 2 by 10, getting 20, and divide by 4, getting 5. Four is as much greater than 2 as 10 is greater than 5.

This principle can be used with a kodak for measuring height, if distance is known. For the kodak itself supplies the other two of the three needed factors. Suppose you have a discussion as to just how high a certain silo or windmill or a church steeple may be. It is not possible for you to climb up and drop a line down. But you have a kodak and a measuring tape.

First, you must know the length of focus of the lens, when the kodak is focussed on a far-distant object. You can measure it with a footrule, taking the distance from the center of the lens to the place where the film is when in position. To find this place accurately, take off the back and lay a ground-glass across the film rollers. For the sake of illustration, let us assume the lens focus to be five inches.

Focus the kodak on infinite distance . . . using the scale, set the pointer at 100. Move away from the object to be measured, a known distance . . . say 100 feet. Take a picture of the object, having the kodak level.

THE COMFORT TOP. HILLARY G. BAILEY.

When finished, measure accurately on the print the height of the image of the steeple or silo or windmill. Let us suppose you find this to be two inches.

You now have three factors of a sum in proportion . . . the focus of the lens, the distance of the object, and the height of the image. The equation is stated this way.

The height of the object (or x) is in the same proportion to the known distance of camera to the object (100 feet) as the height of the image (2 inches) is to the distance of plate or film from lens (5 inches). In shorter form, x is to 1200 inches as 2 is to 5.

Multiplying the "means" (1200 x 2) the result is 2400. Dividing by the known "extreme," the result is 480. This is the height of the spire or silo or windmill in inches. Dividing by 12 we get 40, which is the height in feet.

The same principle worked the other way will tell distance if height is known. Suppose you want to measure the distance across a very hilly or rocky field, and cannot do it with a tape because of the roughness of the ground. Perhaps it is a stream or a pond or a lake of which you wish to know the width.

You must have some object at one side of which you know the height. It may be a tree or a house, the height of which you have previously determined with your kodak, or it may be a pole or the trunk of a tree on which you have made a mark indicating, say, twenty feet, in height.

First, focussing on infinity, or with the pointer at the 100 foot mark on the scale, take a picture as before. The three sides of the equation are found by measuring the height of the image of the object on which you already know the height in actuality. The equation to be worked out will be this: The actual height of the object (a twenty foot pole) is as much greater than the height of the image of it in the photograph (let us say 3/4 of an inch) as the actual distance of the object from the camera is greater than the distance of lens to plate or film (5 inches).

Condensed, this reads, "240 inches is to .75 inch, as x is to 5 inches."

Multiplying 240 by 5, the result, 1200, is divided by .75 with 1600 as a result. Dividing 1600 by 12 to reduce to feet, we get 133 1/3 feet as the distance across the field or stream.

WM. SHEWELL ELLIS.

It is not essential, actually, to make a photograph, if the instrument used has a ground-glass on which to focus . . . the image can be measured in the camera under the focussing cloth with a pair of dividers. A kodak can be given a ground-glass for the purpose by removing the back and binding a small piece of ground-glass across the little film rollers. It is necessary that the lens always be focussed on infinity, that its infinity focus be known, and that the measuring be carefully done. The final result is not accurate to an inch, but, as it is exactly the same method used by the engineer with his expensive theodolite or transit or the surveyor with alidade and telemeter rod, it is as accurate as your measurements permit it to be.

THE WINNER. THOMAS CARLYLE.

THE HARVEST. ERNEST A. BRAY.

WHEN A LITTLE IS BETTER THAN MORE

By HENRY HALL

THE more experienced workers with the camera have long ago discovered that in the making of a picture, a part of the negative—and at times. a very small part of it—regardless of the size of the plate, often makes a pleasing picture although a print from the entire negative would be pictorially hopeless. In fact, it occasionally happens that an inch or less from a 5 x 7 negative, when enlarged to 7 x 9, or 8 x 10, yields a picture welcomed by the Salons, while a print from the entire negative would be rejected on sight.

That this point is not entirely obvious to the less experienced or less successful worker is shown by an inspection of any miscellaneous collection of photographs shown by the camera clubs or elsewhere, where one often sees many a print which would be much improved by drastic trimming.

The experienced worker, however, gradually acquires the habit of composing his picture on the ground-glass, or in his mind's eye, *before making his exposure,* and so often uses nearly the entire plate or film. This is, of course, a decided advantage, especially when using a vest pocket camera, or any of the smaller sizes; but the beginner has all this to learn, and so will find it safer, at first, to take in sufficient territory and then, from a trial print of his negative, select only that part which composes best for his picture. This part may then be enlarged to any size desired, even one or two hundred times enlargement being entirely feasible, provided only that the proper quality has been secured in the original negative—which means a fairly full negative without dense high lights.

As a rule, however, the beginner hardly needs urging to take in sufficient territory, as he is apt to be a good deal like his lens, which, unless hindered, takes in everything in sight; and so the better plan is to study always to select from what is before the camera, only what will compose well in his picture, having always in mind that a "little is better than more."

As an illustration, Figure 1 an 8 x 10 bust portrait was taken

Figure 1.

Illustrating article "When A Little Is Better Than More," by Henry Hall.

from a full length on a $3\frac{1}{4} \times 4\frac{1}{4}$ negative. In this instance, the only lens at hand was one of about 5 in. focus, and the camera was far enough away so that an inch or so in the center of the plate would have the proper perspective. As a matter of fact, a plate $1 \times \frac{3}{4}$ was used with a lens of 5 in. focus from which the 8 x 10 print was made.

In this connection, a suggestion may be useful to the less experienced workers, and that is, do not begin with the larger sizes of bromide, when you decide to try enlarging. Recently, a beginner was asked if he was making any pictures, and he replied that he wasn't doing anything at all just now, as it was too heavy on his pocket book. He said that he had just used up a dozen sheets of 11 x 14 and spoiled every sheet Further inquiry developed the fact that this was his first try at bromide enlarging. This will make the old timers smile, but it wasn't at all funny to the other fellow. And so the advice to the beginner is begin with 5 x 7 or smaller. Then, when it becomes a matter of course to make a fine print, there will be plenty of time to start on the larger sizes. And, when you have the printing exposure just right for the smaller size, it is the simplest matter in the world to figure the correct time for printing any multiple of the small print. Just keep in mind the fact that light varies as the square of the distance, and then, if you have moved the easel twice the original distance from the lens, give four times the exposure; if the distance is three times, the exposure will be multiplied by nine, and so on.

One worker proves all his negatives on bromide post cards, and when he has decided on his final picture, he simply substitutes the larger size of bromide, and has his exposure and printing all worked out beforehand, or, if his proof doesn't warrant further printing, he has spent less than two cents to find it out. Another advantage of the post card size is that the bromide is close to the light, and the image is much more brilliant than in the larger sizes, so that the time of exposure may be more easily judged, while by confining himself to one size for all proofs, familiarity makes the correct exposure almost a habit, so that he has a minimum of spoiled prints.

If the negative warrants further exploitation, he will, of course, retime his exposure more or less so as to get the best possible result from his negative.

THE THINKER. LOUIS F. BUCHER.

TAKING FIGURES UNAWARES

By A. LOCKETT

MANY outdoor subjects are immensely improved by the inclusion of a suitable figure or figures, but (unless one is content with a rear view) this cannot usually be done without attracting the attention of the person photographed, who is either annoyed, looks horribly self-conscious, grins unpictorially from ear to ear, or if of the tramp class, may demand an instant and generous gratuity in unprintable language. Even when the foregoing evils are avoided, the photographer too often finds his work spoiled by nervousness or hurry.

If the picture is to be a real success, the only way is to take the figures unknown to themselves. Various special devices are available for this purpose, among which may be noted a well-known camera resembling a field-glass, but having a concealed lens at right-angles to the direction in which the glass is ostensibly pointed. Another excellent way is to use a telephoto lens and to operate at a discreet distance, a method adopted by many press workers. Cameras have also been made to imitate books, dispatch boxes, and even brown-paper parcels, while other ingenious forms are occasionally used by the police in tracking criminals.

A goodly number of photographers, however, would no doubt like to be able to use their own apparatus occasionally in this undetected fashion, for purely pictorial purposes. It can be done by holding the camera so that the lens really points sideways, while the operator faces in a direction at right-angles to that of the lens and appears to be innocently photographing something afar off. A box camera with an inconspicuous lens is necessary, since it looks pretty much the same from all sides. The bellows and bright brasswork of the folding type would at once give the trick away.

The chief difficulty is with the finder. The image is seen lying on its side and is, therefore, awkward to judge, while it obviously will not do to twist the head round in order to look at it. The object of the present article is to describe a simple

INDIAN SUMMER. By Floyd Vail, F.R.P.S.

accessory which has the effect of turning the finder image half round, so that it is seen upright although the camera is pointed sideways. The finder must be of the ground-glass pattern, the brilliant kinds not lending themselves well to use in this way.

As shown in Figure 1, the device consists of a short cardboard or metal tube A of a diameter adapted to the size of the finder, having the top B covered and a rectangular aperture cut in the side. A piece of very thin looking-glass C is fixed upright in the tube so as to be at an angle of 45° to two adjacent sides of the finder opening D. A circular disc is then cut to fit the bottom of the tube with an aperture in it

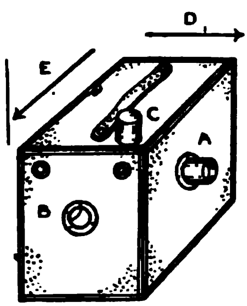


Fig. 5

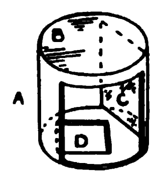


Fig. 1

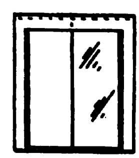


Fig. 2

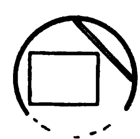


Fig. 3

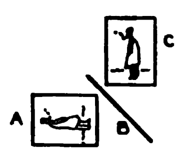


Fig. 4

the same size as the ground-glass of the finder, and is glued in. The inside and outside of the tube should be painted a dull black. Figure 2 is an elevation of the device, while Figure 3 is a sectional plan.

The appliance is fixed to the top of the camera, over the finder opening, by means of a small screw through the bottom disc, a touch of glue, or in any other convenient way. The opening in the tube, of course, must face the worker, not the subject. The camera is held so that the device is a little below the eye level, then, on looking through the opening, the image in the finder will be seen reflected upright in the mirror. Figure 4 illustrates the principle, A being the lying-down image produced when the camera lens is pointed to the *left* of the

operator, B the position of the mirror, to the *right* of the finder, and C the erect image as seen in the mirror.

So many people nowadays know at least a trifle about photography that some additional harmless subterfuge may be expedient. A neat idea is to fit a dummy lens to one side of the camera, as at A in Figure 5, or a real lens if one can be spared. This may be as bright and brassy as possible in order to attract the eye. There will then be little likelihood of anyone but a photographic expert noticing the recessed and blackened lens B which is really used. The finder accessory is fitted at C, the arrow D showing the direction in which the camera is ostensibly pointed and in which the operator is looking, while the arrow E indicates the actual working direction. It will be noticed that in this illustration the camera lens points to the *right* of the operator, as may sometimes be preferred, or rendered necessary from the position of the finder. When that is the case, the mirror in the tube must be fixed to the *left* of the finder opening, instead of to the right as in the preceding diagrams. This must be borne in mind.

The illustration, "On the Embankment," is fairly typical of the kind of picturesque figure study which the accessory will render easily possible without need for caution or delay, but which might otherwise prove embarrassing to obtain. The familiar nuisance of an expectant group of mischievous street urchins deliberately taking up position in front of the camera is also rendered innocuous, since they will, in fact, be facing the dummy side.

It is, of course, quite practicable to enclose a small folding camera in an external wooden case made to resemble a box-form camera, with a hole at one side for the lens to point through and a finder accessory fitted as described to work at a right-angle. Many other ways of using the device will no doubt occur to the ingenious worker.

ON THE EMBANKMENT.

Illustrating article "Taking Figures Unawares," by A. Lockett.

PHOTOGRAPHY OF THE NUDE

By ANGUS BASIL

THE much criticised photography of the nude is one of the most, if not the most, fascinating branches of the photographic artist's work. Taking for granted that the human body is the most beautiful thing in creation. Its portrayal in a beautiful and realistic photograph should assist the development of a greater respect for humanity. Of course, the work must be good and devoid of suggestion. This latter is more easily obtained with the nude than the slightly draped.

Finding the ideal model is the greatest difficulty. While the painter can work from several models, the photographer must use one. Again, the painter uses his model to obtain his drawing, the dramatic idea he imparts himself, while the photographer needs a model with a dramatic sense, one whom he can enthuse with his own ideas.

Having found his model the photographer can follow many lines, he may depict; emotional subjects, pictorial compositions, studies of line and drawing, quality of modeling, etc. If he is exceptionately gifted he may combine some, or all of these. However, a simple idea completely carried through in most cases is more likely to succeed.

There should never be any suggestion of nakedness about a nude. This to most minds will express a truth that needs no emphasis. Low tone work helps in this respect, but although low in tone there is no need to loose modeling. A flat, muddy print may have qualities of composition, but these qualities attain small attention without roundness and contour. This roundness, or almost stereoscopic effect, together with the beautiful texture of flesh, is the great charm of nude photography.

Illustrating article "Photography of the Nude," by Angus Basil.

STUDYING THE CHILD FOR CHILD STUDIES

By B. C. DEMIEN

STUDYING the child for child studies! A very essential factor in child portraiture, a subject to be carefully thought about whenever children's pictures are attempted, yet how very seldom do we find any effort made to give this all important matter the proper and serious consideration it really deserves.

Invariably, when photographing the child, the deplorable mistake is made of attaching too much importance to minor details.

Painfully scrubbed faces, shiny, unnaturally combed hair, and immaculately clean, uncrumpled dresses, appear to be the indispensable "first aids" for good pictures, in the average course of procedure today.

When fond mamma observes a tiny wrinkle in Baby's dress or a slight deflection in Junior's tie, little imperfections which would, perhaps, add to the naturalness and charm of the picture, the youngster is immediately hauled and jostled about, until the fault has apparently been remedied. Then, to mother's horror and distraction, another larger and more formidable wrinkle has made its appearance, while the tie has gone awry one-sixteenth of an inch in the other direction and the entire proceeding of fussing and rearranging must be repeated, much to Baby's and Junior's great discomfort.

After these absolutely unnecessary preliminaries are finally over with, quite naturally the child's patience has been taxed to the utmost. Result—an unnatural, irritable, fretful subject, instead of an unaffected, happy and carefree little model to work with. Moral—keep mother out of the room while baby's picture is being taken.

To photograph the child with any degree of success, be the operator amateur or professional, a vitally important requisite necessary for this very interesting phase of photography is,

DRIFTING. WM. C. VERBURGT.

first of all *patience.* Not a wonderfully equipped studio is necessary to achieve satisfying results, nor an unusual camera or exceptional lens, nor a marvelous knowledge of composition. Although a well lighted studio and a reflecting type of camera with a fast lens will aid materially in the making of a picture, they will prove of very little use to the operator who has not acquired the art of being patient, of learning to bide his time and await the opportune moment when the child can be photographed in a pleasing and desirable mood.

And because these moods and fancies vary with each passing moment, no time must be lost in getting them once they make their appearance. Quick work and action are then required.

The average, normal youngster is at all times so full of bubbling spirits, of spontaneous cheerful action when left to amuse himself in familiar surroundings, that once the proper amount of patience, and, perhaps, technical knowledge have been acquired by the operator, no difficulty at all will be found in obtaining a dozen different views, depicting as many different moods. And all this before the child has even begun to realize that he has just undergone an experience which most youngsters seem to have a natural aversion to, namely, "having his picture took." This instinctive dislike is inherited, perhaps, as for years it has been customary to prepare for an event of this kind with the usual amount of frills and laces, stiff collars and starched petticoats—necessary evils which invariably made the youngster feel hot and uncomfortable and generally out of sorts.

The visit to the formidable looking studio made a worse impression, probably, than the tight fitting clothes. The high, unfamiliar room, with strange, huge reflectors and backgrounds scattered about, the immense camera, wheeled back and forth until the proper focus had been attained, and the disheveled operator himself, head appearing and disappearing under the black focusing cloth—small wonder that the youngster was frightened half out of his wits long before the exposure was ever made.

Consequently, was it at all surprising when, a few days later, the final results of this trying ordeal were submitted for the approval of those most interested, that, although a fair, stiff likeness had perhaps been obtained, they should feel a vague, indefinable something (just what it was seemed diffi-

STYGIAN SHORES. **Louis A. Goetz.**

cult to say) which they were unconsciously familiar with in their everyday association with the child, had apparently been forgotten—had been omitted from the picture entirely. It gave them a queer feeling of strangeness—it was their Junior without a doubt, yet not the Junior they knew; it might possibly be Baby, but surely not the baby they were used to romping and playing with every day in the year. It was, yet was not, their child. Singular, yet how very natural indeed.

If these loving, though inexperienced, parents could but understand that merely a photograph had been taken, the exposure simply made with very little thought given to the study of the endearing little traits and idiosyncrasies characteristic of their child, perhaps they would realize then what the trouble was. The physical likeness was there to a degree, but the spirit and expression, the naturalness and unaffectedness, which they knew so well and prized so highly were lamentably absent.

What little characteristics and natural likeness the camera succeeded in registering had perhaps been eliminated through the much abused medium of retouching the negative, which, when attempted at all, was generally overdone. A well known authority on the subject once said that portraits of the extremely old and those of the extremely young should be absolutely void of retouching. Portraits of those in between these two classes should be retouched only as much as the vanity of the sitter demanded, and no more. The writer heartily agrees with him. *Do not retouch a child's face!*

Perhaps, had the environment been different, better and more satisfactory results would have been obtained. A few (far too few) professional photographers throughout the country, at present specializing in the photographing of children, have equipped their studio with every conceivable toy, besides sand-boxes and rabbits—in fact anything that will tend to interest the child and assist in making him forget himself and the camera.

A step in the right direction, surely, but the writer contends that the proper place, the real setting, the only environment in which to photograph the child, is the home. Here, he will, without a question, be absolutely at his ease. His surroundings are familiar, only the operator is strange, and he, with a little tact, can easily ingratiate himself into the confidence

of the child by telling stories, by playing with him, or standing on his head for him, if necessary—in fact, by any feasible method which may present itself at the time. True, there are technical difficulties to be overcome in home photography which are not met with in the studio. Proper lighting conditions are not always possible in the average home. However, if these are found absolutely impossible, the combination flash bag and artificial spotlight can always be resorted to. Or, in the summertime, no better studio can be found than the Great Outdoors, where innumerable lighting effects can be obtained after a little experiment and study.

The mere fact that the child is on "home grounds," as it were, far outbalances, in the writer's opinion, the slight inconveniences and difficulties experienced in using the home as a studio.

Although the amateur may be inclined to doubt it, he will find after a little investigation on his part, that the lighting conditions in his own home are far better than he might imagine. The old idea that an overhead skylight is absolutely essential has long ago been disposed of. Several of the best professionals whom the writer is personally acquainted with have no skylight, but work chiefly with window lighting, aided, perhaps, by a minimum amount of artificial light, merely to illumine the darkest shadows.

So, for the amateur's benefit, the writer would advise that he try photographing his child again. Be patient with him and do not try to hurry him! You know his little moods far better than the best professional will ever know them, and are at the same time in a position where you can more easily photograph him when desired. Always make it a point to have your camera ready and your holders loaded, in order that, when called upon to act promptly, you can do so at a moment's notice. Some of the best child studies today, many of them prize winning pictures, have been obtained in this manner.

For the advanced amateur, who is anxious to make some money with his camera, it might be timely to suggest that there is a big field open to anyone ready to specialize in the photographing of children. Very few professionals seem to be aware of this fact, but investigation proves that specialists in this particular line who do nothing but child portraiture and advertise to this effect, never find any difficulty in keep-

STUDY IN CURVES. WILBUR E. TAYLOR.

ing well supplied with work, provided satisfactory work is produced and prompt service given.

Besides, photographing in the home requires no large expenditure for an elaborate studio outfit. Neither does it demand a certain amount of capital constantly necessary for overhead expenses in the ordinary studio business.

A good, reliable camera (reflex type preferred), one which the operator has made himself entirely familiar with, a steady tripod, and a white sheet for reflecting purposes, are really all that is required in the home portraiture outfit. A few good samples of work previously done always come in handy. In addition, a good supply of plates (do not hesitate to make plenty of exposures—it pays in the end), a natural love for and interest in children, ability and desire to study the child as previously mentioned and you are ready to go to work. And above all, *be patient!*

Someone once said, "Confidence is the basis of all trades." It should have been "patience" which would prove especially applicable to the photographing of children.

MT. RAINIER, NATIONAL PARK. E. MILDRED BOWER.

ANN SPENCER. JESSIE TARBOX BEALS.

CANE RIVER. DICKESON'S STUDIO.

THE TELEPHOTO LENS

By Henry F. Raess

HOW often has an amateur photographer on looking through a lens catalogue in coming across that part describing the telephoto lens wished he had one, and the wonderful distant pictures he could make with it. But usually the high price deterred him from its purchase when the complete lens, positive and negative elements were the subject. He would probably also find on another page that he could have a telephoto lens at a much less outlay by getting only the negative lens with a suitable mount and adapting his own positive lens to it.

But let us look at the matter a little more closely and see if he could have made such wonderful pictures had he possessed either of the lenses. There is much more to the intelligent use of the telephoto than to the ordinary photographic lens, either the old rectilinear or the newer anastigmat. One is apt to be very much disappointed in the use of the telephoto lens unless its limitations are known and studied. There is an old maxim that there is no gain without loss, and this holds true for this type of lens. It is a fault of most books

UP IN THE EARLY MORNING. EDWIN B. COLLINS.

on photographic lenses that they do not explain in sufficient detail just what can and what cannot be done with these lenses.

The inexperienced user thinks that he can secure unlimited magnification if he has either sufficient bellows or negative lenses of short enough focus. But when he tries to do that he quickly finds that something is wrong even supposing his exposure was correct, the latter being one of the pitfalls of the beginner.

We will suppose you have screwed the positive or front lens in the telephoto mount and removed the rear or negative lens. Now on focusing on a distant image, this will have a certain size and sharpness. If the negative lens is screwed in place, and the image viewed again, it will be found by slightly changing the distance between the lenses, or racking the bellows in or out, a much larger image results. If this image is carefully examined, and this can be done better on the negative than on the ground-glass it will be noticed that the general sharpness is less than that given by the positive lens alone.

This loss in sharpness may be due to imperceptible vibration, telephoto apparatus being very sensitive to this. The loss also may be due to the image of the positive lens being magnified by the rear or negative lens.

The next thing then is to stop down in the usual manner to increase the definition of the image. But here a new trouble arises, unless the magnification is only a few times the image loses in sharpness if a smaller than the second or third stop is used unless the positive lens has an extremely large aperture as F/4.5 or larger. One also must not lose sight of the fact that the F: values engraved on the mount of the positive lens no longer represent the same values when used in conjunction with a negative lens, and these values change with the magnification. For example, if we are using a positive lens of six inch focus working at F/8 and an eight times magnification the F/8 stop is no longer F/8 but F/64. It will also be noticed that as the magnification increases the apparent lack of depth of focus becomes more pronounced.

Unless great stress is placed on sharpness a little of this may be sacrificed by stopping down and increasing the depth of definition. The theoretical limit to stopping down is F/72, but in practice a much smaller stop may be used, especially if the diameter of the stop is not less than 6mm or ¼ inch.

STORMSWEPT. H. J. Campbell.

The theory of the loss in sharpness is that diffraction takes place. Also as the magnification increases the general sharpness decreases, the extent of the decrease depending upon the cutting qualities of the positive lens. In telephoto work only a narrow angle of view is used, say from five to fifteen degrees. (In the above six inch lens on a 5 x 7 plate at eight times magnification the angle would be ten degrees.) A positive lens having a very sharp central image is preferable. One lens manufacturer recommends using a very good portrait lens in connection with a suitable telenegative. This really makes one of the best combinations since portrait lenses (Petzval type) are extremely rapid sometimes working at F/3 and often possess a central image of from five to ten degrees having a sharpness not equalled by the best anastigmats.

This sharpness is caused by the intentional introduction of spherical aberration which causes an elimination of practically all astigmatism over a small angle. If the photographer possesses an anastigmat (positive) lens and wishes to combine this with a telenegative better results will be obtained if the negative lens is calculated to work with this particular type of positive, since the optical correction of anastigmat lenses is easily destroyed, which would cause a loss in sharpness of the image.

One of the newer developments of telephoto lenses of high performance are those with fixed separation, that is, the distance between the positive and negative lenses cannot be changed without destroying the correction. They are really unsymmetrical anastigmats. These lenses project an image about twice the size that an ordinary lens would give for the same bellows length. They are quite speedy, giving good satisfaction, and are well liked by press photographers.

This article must not be misconstrued as being an attack on the use of the telephoto lens, but to indicate to the beginner where his troubles may lie, and help him to get results without much loss of time in experimenting and wondering why the pictures are not better. For those who take more than a casual interest in this work the following three books are recommended; for the beginner, *"Photographic Lenses"* by Conrad Beck & Herbert Andrews, and for the advanced worker *"Telephotography"* by Dallmeyer, and *"Modern Telephotography"* by Capt. Owen Wheeler.

Diagram A.
Illustrating article "Two-Color Carbro," by Sophie Louisa Lauffer.

TWO-COLOR CARBRO

By SOPHIE LOUISA LAUFFER

WHILE considerable white paper has been consumed in a discussion of the carbro process, little has been said on the subject of developing the carbro print on the original bromide base. This is simpler than the usual transfer method and has some advantages notably that of giving a rich, well graduated picture from a flat negative. This usually difficult feat is accomplished by developing the carbro print on the bromide instead of transferring it to another sheet of paper and then redeveloping the bromide print, resulting in a multiple image, viz., the original bromide picture reinforced by the superimposing upon it of a carbro image.

And a very interesting field, one pregnant with possibilities at the hand of a careful worker, is the use of two or more colored tissues with a view of producing a print containing two or more colors.

Diagram B.

Diagram C.

Illustrating article "Two-Color Carbro," by Sophie Louisa Lauffer.

Perhaps the easiest way to make myself clear will be by the use of reproductions. Diagram A is the original bromide print. Diagram B is a print in which the roses have been rendered inactive by bleaching with No. 1 carbro solution. A sheet of sea green carbon tissue is immersed for the usual time in the No. 1 and No. 2 baths, or in the combined bath referred to in Mr. Alcock's article, and is then placed in contact with the bromide print for the purpose of bleaching the print in the usual manner. Then, instead of stripping the tissue from the print and proceeding in the conventional way, the tissue is left in contact with the print for the usual bleaching time, say twenty minutes, the print and tissue are then placed in developing water and the carbro is developed on the bromide. This will result in changing the black and white image of the leaves and branches shown in Diagram B to a green image shown in Diagram C. With a brush charged with ordinary metol-hydrokinon developer, the petals of the rose are redeveloped as shown in Diagram D. We then have the picture consisting partly of a carbro print and partly of a bromide print. Carmine carbon tissue is then immersed in the usual baths, squeegeed down upon the print and, after allowing sufficient time for the bleaching of the petals, it is developed in the same manner as Diagram C, giving a result, Diagram E, consisting of pink roses with green leaves. This method is, of course, equally applicable to portraits or landscapes, or in fact to any print in which the colors are well defined.

***Editor's Note.** Miss Lauffer's diagrams are in colors, and of course the reproductions in monochrome do not do justice to the beautiful color rendering of the originals.*

Diagram D.

Diagram E
Illustrating article "Two-Color Carbro," by Sophie Louisa Lauffer.

COMBINATION PRINTS

By WILLIAM H. ZERBE

EVERY once in a while one reads in the photographic magazines, articles condemning anything but straight photography, meaning any photograph that has been manipulated or controlled to bring out certain results which the original negative did not contain. They blacklist gum prints, bromoils, and above all, combination pictures. Judging from the increasing number of such pictures accepted in the various salons, their preaching apparently has no effect.

Since I can not paint with brush, or draw with pen or pencil, and I have an idea or inspiration for a picture, I see no reason why I should not use photography only as a means to an end; viz., the accomplishment of a picture, as the artist does with his brush, pen, or pencil. The painter will make notes and studies of promising material at different places, and at some future time will incorporate them into some picture of a scene that needed just something of that sort to carry out his idea to a successful end. For the same reason I make exposures on many subjects which in themselves are not worth printing, but I keep them for future use to work into other pictures where I feel they can be improved. Now, if I can show such a finished picture—that is, if my proportion, lighting, and perspective, aerial and lineal ring true to the observer —it should be judged by the result and not the means.

The method I use is somewhat different than that used by Macnaughton, of Brooklyn, and Whitehead of Great Britain, whose combination pictures are so well-known all over the world. They print direct from different negatives instead of patching or building up as I do. My method, I believe, is much more simple, and in the hands of such artists as they are, I think the results would approach their present method. It is simply a patchwork of prints made from different negatives rephotographed. The qualifications for making such pictures, are some knowledge of composition and good judgment in the selection of negatives that will harmonize in light-

A. MC FARLIN.

ing, perspective, and proportions. "The Shepherd and His Flock" (Figure 1) and "The Life Guard" (Figure 2) are two examples of such combination prints.

Before going into detail as to how they were made, I will ask the reader to examine them first and see what faults they contain. The first picture received a second award in one of the Shadowland Contests, and the other was accepted in Los Angeles, Pittsburgh, and Toronto Salons. Evidently the judges did not discover any faking! On several occasions when some of these combination pictures were passed around, they were taken for straight prints, but when told they were combinations all kinds of defects were discovered, usually something different from the added parts.

"The Shepherd and His Flock" (Figure 1) was made from four negatives. The main landscape was made in New Jersey along the Morris and Essex Canal, the clouds on Long Island, the sheep in one part of Pennsylvania, and the shepherd in another part ten miles away. This picture was not thought of until some time after all parts were made. Finding the path along the canal looked empty, the idea came to combine the several pictures.

An 11 x 14 piece of bromide paper was tacked on the enlarging easel. The landscape negative was thrown on the paper, exposed and developed in the usual way, and then dried. This was again tacked on the easel, and the cloud negative thrown on the bromide print. Marks were then made for future printing. The sheep negative was then thrown on the bromide print and focussed to what appeared to be the right size. The bromide print was now taken down and several pieces were exposed from the sheep negative in order to determine the size necessary. They were finished in the usual way. The old name's size was determined from the size of the sheep. Several sizes were made and dried.

Next another bromide print was made to correspond with the trial print from the landscape negative. Registration marks were made on the easel and taken off and the cloud negative focussed on a blank piece of paper, focusing it to correspond with the marks made on the trial sheet. The blank paper was now taken down, and the bromide paper with the exposed landscape put on with the registration marks corresponding. The cloud negative was now exposed, shading

THE SHEPHERD AND HIS FLOCK

Figure 1.

Illustrating article "Combination Prints," by Wm. H. Zerbe

the landscape portion guided by marks previously made on the side of the easel when the landscape negative was focussed. After the exposure of both negatives was made, it was developed and showed a landscape with a cloud which previously had a blank sky. This was washed and pasted on heavy cardboard, and dried. Several sizes of the sheep prints were now cut out with a razor blade holding the blade in such a way to cut the paper from below making almost a knife edge all around.

These different size prints were placed on the bromide print, moving them about for the right position, and the different sizes for the right proportions. The same method was used to get the position and proportions of the shepherd. These finally determined, the cutout prints were rubbed down with sandpaper about three-eighths of an inch from the edge tapering down to nothing. The prints were now soaked until limp and laid on a piece of glass and covered with paste on the back, and placed on the bromide print in the proper position and rolled down. The whole picture was then copied with a soft focus lens, and a new negative made of the whole. The idea of skiving or rubbing down the back of the print, is that when it is pasted down it leaves no edge and therefore when copied shows no shadow.

In making "The Life Guard" (Figure 2), the negatives were made at the time with the definite idea of combining them. The steamer is the "Northern Pacific," which went ashore on Fire Island with returning soldiers shortly after the armistice. It was so close to shore that it was impossible to get the whole of the steamer and the Life Guard's boat without showing too much shore. Having a desire to have such a picture with the life guard standing out strong and not too small, a negative was first made of the steamship, going up the beach quite a way, thus getting in the whole of it from a perspective point of view. A negative was then made of the life guard pushing off from the beach. Keeping in mind the angle—the steamship was made, getting a corresponding point of view. When the negatives were finally developed the picture was built up in a similar way as the "Shepherd and His Flock" (Figure 1). There was no cutting done on the steamship print. The original negative of the life guard shows a large part of the ship which was all cut away. When the life guard and boat were pasted

THE LIFE GUARD.

Figure 2.

Illustrating article "Combination Prints," by Wm. H. Zerbe.

on what I considered the proper position, the lower portion of the breaking surf was pasted on from a print made from another negative, and copied with the result you see.

I have made quite a few of these combination or built up pictures, and to get them by so-called straight photography, arranged as I have done, would have been a matter of more good luck than I have ever encountered in a hunt for good compositions and arrangement of subjects. I feel the examples shown here are not impossible or untrue, and since they have been favorably criticised, I feel that I am getting away with it.

Some years ago at an exhibition and competition held by a camera club, Mr. Frederick Kost, one of the judges and a prominent New York painter, was asked after the awards were made what he thought of a man who did some manipulating and hand work on his print, referring to the winner of the first award. Mr. Kost replied that he did not care so long as he was not caught at it, and since this man did not get caught he was complimented for making a picture out of an ordinary photograph. Mr. Kost further replied that whenever he looks at pictures he never questions the means, if the results are pleasing to him he is satisfied.

FRANK W. BROOKS.

LOOKING THROUGH THE BRIDGE. CHAS. F. KOEBERLE.

PHOTOGRAPHIC REVIEW OF 1923

By C. B. NEBLETTE

IN again preparing for the *American Annual of Photography* this brief résumé of the progress of photography along scientific lines during the past year the writer wishes to repeat what he said in beginning his article last year. 1. That it is obviously impossible for an article of this kind to give much information in detail. It can only serve to direct those interested in any particular subject to work which has been published along these lines during the past year. 2. A complete bibliography is impossible owing to the immense amount of work which is being done, consequently it has been necessary to limit this résumé entirely to the general process of photography, and omit entirely any applications of the subject however important they may prove to be. 3. A more complete bibliography is to be had from several sources. The Royal Photographic Society of Great Britain publish quarterly, Photographic Abstracts, the Research Laboratory of the Eastman Kodak Company, the Monthly Abstract Bulletin, and American Photography conducts a section called "The Photographic Review," while an entire publication in French is devoted to abstracting photographic information. Science Technique et Industrie Photographiques, published by Paul Montel Pub., 35 Boul. St. Jacques, Paris. To these readers, who wish to keep up-to-date, should go for a more complete account of the year's work.

NEW PUBLICATIONS AND BOOKS

One of the most valuable works of the year is that by Dr. E. Goldberg and titled "The Formation of the Photographic Image" (Der Aufbau des Photographisches Bildes). The entire book deals with the theory of tone reproduction following the methods worked out by Jones, Hurter and Driffield and others. The range of light intensities of typical subjects are discussed together with a method of measuring them. The subject of sensitometry, and the conditions of tone ren-

OLD SPANISH CHURCH,
ST. AUGUSTINE, FLORIDA.

DR. J. B. PARDOE.

dering by the photographic emulsion, are considered following the discussion on light intensities, and the book ends with the accuracy of reproduction by various printing processes. From the standpoint of tone reproduction problems it is one of the most important publications for a long time.

Mr. A. H. Nietz of the Research Laboratory Eastman Kodak Company, in Monograph No. 2 on the Theory of Development has dealt exhaustively with the relation of developing agents and their respective reduction potentials; with the various methods of determining the value of the reduction potential; with the effect of bromide on the value of the inertia and the characteristic curve; with the velocity of development, the equilibrium constant, maximum density and contrast and their relation to the reduction potential of a developing agent, and with the fogging power of developers. A new method of plate speed measurement is suggested whereby the use of the inertia point be abandoned, and the coordinates of the points of intersection of the straight line portions of the curves obtained with development for varying times be used.

In Monograph No. 3 from the Research Laboratory of the Eastman Kodak Company, Dr. S. E. Sheppard treats of the manufacture, properties and testing of gelatine. While entirely technical and of principal interest to the colloid chemist, the practical photographer will find certain portions of value, as for instance the first chapter on the history of the application of gelatine in photography.

Two new publications began publication during the year, namely; The New Photographer published at Liverpool (81 Dale St.) and Science Technique Industrie Photographiques by Paul Montel Publications, 35 Boul. St. Jacques, Paris.

LENSES AND PHOTOGRAPHIC OPTICS

In a series of papers to the British Journal of Photography, George E. Brown, Editor, of that publication reviews the principle of depth of focus, the meaning of hyperfocal distance and its determination, the various formulae for the calculation of the distance to which depth extends, and the principle of the "plane focussed for" according to the method of Von Rohr. *Brit. Journ. Photo.*, 1922, 476, 492, 507, 521, 534.

The origin of the camera obscura is discussed in a paper

THE YOSHIDA TEMPLE, KYOTO. By Y. Malony Kumazawa.

by G. Potonniée and special reference is made to the work of Jean Baptiste Porta. References to early manuscripts show that there is considerable doubt regarding the earliest accurate description of the principle of the camera obscura.

Bull. Soc. Franc. Photo., 1923, 52.

The Traill-Taylor Memorial lecture of the Royal Photographic Society of Great Britain last year consisted of a résumé by Dr. Reginald S. Clay of the history of the photographic lens with special reference to the products of English opticians. *Photo. Journ.*, 1922, 458.

Many of even the newer lenses are imperfectly corrected for chromatic aberration and show a chemical focus when used for enlarging with certain lights. H. L. in the British Journal has given formula for finding the difference in the chemical and visual foci at any degree of enlargement or reduction.

Brit. Journ. Photo., 1922, *p.* 475.

William Hodgkinson Jr. in an article in the August 1923 issue of American Photography gives formulae for the calculation and construction of a convertible soft focus lens using for each of the single elements meniscus spectacle lenses. Details of the mount construction, and how to obtain the required lenses, are given. *Amer. Photo.*, 1923, *p.* 482.

A very useful method of graphically determining the depth of focus for a given aperture and focal length is described by Mr. H. W. Lee in a communication to the Royal Photographic Society, and published in the Journal.

Photo. Journ., 1922, *p.* 229

Clay's method of measuring the focal length of a lens has been brought forward again by Jobling and Salt. A plane mirror is placed behind the lens, and the point determined at which the light is reflected back on its own path so that the image of the light coincides with it. The distance between this point (the focus) and the nodal point is the focal length of the lens. *Brit. Journ. Photo.*, 1922, *pp.* 137, 140.

Debenham's method of determining the focal length of a lens by a single measurement of the distance between object and image is obviously incorrect unless the nodal points coincide, which is rarely the case in modern lenses. A. Lockett

shows that if two measurements are made using different distances the correct focal length may be obtained.

Brit. Journ. Photo., 1922, *p.* 434.

Ross Ltd. of London have improved their fixed magnification telephoto lens formerly known as the Telecentric and have introduced the newer construction under the name of Teleros. The new lens is better corrected, and smaller and lighter than the older form. *Eng. Patent*, 188,621, 1922.

Mr. S. M. Collins in the British Journal gives a series of charts for finding the relative exposures when enlarging, reducing or copying on different scales which are somewhat simpler than those which have previously come to the writer's attention. *Brit. Journ. Photo.*, 1923, *p.* 31.

SENSITOMETRY AND SENSITOMETRIC APPARATUS

Those interested in experimental sensitometry will find directions for simple plate speed testing with inexpensive wedges in an article by E. J. Wall. The article opens with a review of early obsolete methods of determining plate speeds which those historically inclined will find interesting.

Amer. Photo., 1923, *pp.* 298, 356.

Mr. L. A. Jones, of the Eastman Research Laboratory, has devised a sector wheel sensitometer which is free from the intermittency errors formerly associated with instruments of this type. The point wherein the new instrument differs from, and which is the improvement over early types, is the arrangement by which the plate is exposed for only one turn of the sector. The instrument is being used for investigations on the reciprocity law for which purpose it is well adapted, as automatic exposures from .0002 second to 16 hours may be obtained. For other work it is questionable whether it is superior to the non-intermittent sensitometer worked out by Mr. Jones several years ago. *J. Opt. Soc., Amer.*, 1923, *p.* 305.

Mr. L. A. Jones has devised a new type of photometer using rotating sectors and the Lummer-Brodhun comparison head which enables densities up to 8 and 10 to be read with very good accuracy. The new instrument is thus much superior for the measurement of high densities, such as are encountered in the investigation of X-ray, or process emulsions, than the apparatus formerly available which would only measure

THE ARTIST. IRVING BERKEY.

up to about 2.5 to 3. The construction of the apparatus is fully described in the original paper and cannot well be abstracted. It may be mentioned, however, that as its cost is approximately $3500, its use will never become very extensive, except among those especially interested in photographic investigation. *J. Opt. Soc., Amer.*, 1923, *p.* 231.

Davis and Walters of the Bureau of Standards have tested the sensitometric characteristics of the plates and films on the American market and also their color sensitiveness and resolving power. They made use of an electric standard and a sector sensitometer. The speed is given as 10/*i*. The work loses most of its value because of the fact that the names of the products tested are not given. This while possibly impractical from a politic standpoint lessens the practical value of the work. *Bur. Stand. Papers, N.*, 439.

GELATINE

Dr. T. Slater Price read a very interesting paper on the properties of gelatine before the Royal Photographic Society of Great Britain last year. Unfortunately it cannot be adequately abstracted, and we must refer those interested to the original paper in the Journal. *Photo. Journ.*, 1922, *p.* 356.

Dr. S. E. Sheppard contributed to the pages of the Journal of Industrial and Engineering Chemistry during the past year a very interesting survey of the part played by gelatine in various photographic operations. Beginning with the function of gelatine in the photographic emulsion and the selection and properties of gelatine suitable for emulsion making, Dr. Sheppard goes on to describe the action of gelatine during the operations of development and fixing. A special instrument called the "auxometer" has been devised to measure the amount of swelling. Incidentally Dr. Sheppard also mentions that the time of fixation is at the minimum with a hypo concentration of about 40 per cent.

J. Ind. Eng. Chem., 1922, *p.* 1024.
Brit. Journ. Photo., 1922, *pp.* 677, 695, 710.

PHOTOCHEMISTRY

By the use of the microbalance Hartung has shown that thin films of silver chloride, bromide or iodide lose weight when exposed to sunlight. That this is due to the loss of

"I WILL LIFT UP MINE EYES UNTO THE HILLS." LAURA GILPIN.

halogen may be assumed from the fact that the original weight is restored upon rehalogenation. It was also found that silver bromide decomposes into silver and bromine, and all evidence points to a similar action on the part of the chloride and iodide of silver. The presence of oxidizing agents does not seem essential. *J. Chem. Soc. (London), 1922, p. 682.*

The conductivity of the latent image has been measured by A. G. Rabinovitch who finds that there is no appreciable difference in the resistance of the exposed and unexposed silver bromide. *Journ. Phys. Chem., 1922, p. 577.*

Messrs. S. E. Sheppard and E. P. Wightman have investigated the action of hydrogen peroxide on emulsions, and find that there is a very close similarity between plates exposed to daylight and those bathed in peroxide solution. By varying the time of immersion, or the concentration, curves were obtained which are practically identical with the H.&D. curve and include the period of reversal.

Journ. Frank. Inst., 1923, p. 195, 337.

THE SILVER BROMIDE GRAIN OF PHOTOGRAPHIC EMULSIONS

One of the most important, perhaps the most important, scientific papers of the year was that which formed the substance of Dr. Svedberg's Hurter and Driffield lecture before the Royal Photographic Society last May. The paper cannot be abstracted, and we may only remark that it deals with the validity of the Einstein theory as applied to photochemistry, the problem of sensitivity, plate sensitiveness and grain sensitiveness. *Photo. Journ., 1922, 310.* *See also pages 183, 186.*

Mr. F. F. Renwick contributes to the Journal of the Society of Chemical Industry an outlne of the process of making a photographic emulsion, and the problems of the photochemist which have not yet been settled, or which are applied blindly without their scientific bearing being understood.

J. S. C. I., 1923, p. 43r.

The various arguments for and against the quanta and the grain structure theory in relation to development have been discussed by Clark who has duplicated the effect of light by using a solution of sodium arsenite. He finds that

VERNAL FALLS. CHARLES L. SNYDER.

the distribution of the developable centers is the same with sodium arsenite solution as with daylight, and he therefore concludes that the developable centers are an essential part of the grain and exist before exposure.

Brit. Journ. Photo., 1922, *p.* 462.

In a paper before the Royal Photographic Society of Great Britain, Mr. F. C. Toy gives an account of his investigations on the sensitivity of silver halide crystals being similar both in size and geometrical formation. Grains of approximately the same size and having identical geometrical structure were picked from his emulsion and the emulsion then exposed and developed. By plotting the percentage of the grains which become developable against the exposure a curve is obtained which is of the usual type, thus showing that grains of similar size and formation are not equally sensitive.

Photo. Journ., 1921, *p.* 417.

Last year the subject of the transference of development from one grain to another seemed settled from Svedberg's statement that grains of silver halide are not reduced unless actually light struck, but a paper on the same subject this year by Messrs. Trivelli, Righter and Sheppard tend to show that, in some circumstances at least, there is a transference of development from light struck grains to those which closely adjoin them. They find that whenever the grains bunch together to form a "clump" the clump acts as a unit during development whether completely light struck or not. The difference in Svedberg's conclusion is due to the fact that the latter used an emulsion of spherical detached grains, while Trivelli, Righter and Sheppard used an emulsion containing a large number of clumps. *Brit. Journ. Photo.*, 1922, *p.* 407.

Toy challenges the statement of Silberstein, Trivelli and Righter that when grains of an emulsion are clumped together they act as one grain for development. The former declares that any number of cases may be shown where of two grains in contact only one is rendered developable.

Brit. Journ. Photo., 1922, *p.* 443.

Mr. Trivelli replies to the criticism of Toy in the British Journal of Photography 1922, p. 904.

A series of papers titled "Studies in Photographic Sen-

R. B. M. Taylor.

sitivity" have been published since the last writing by Sheppard, Trivelli, Wightman, of the Eastman Research Laboratory.

The first paper discusses the existence and nature of the statistical difference of sensitivity among silver halide grains, the relation of the variation in sensitiveness to the inertia, and the exposure-density function and the influence of grain size and distribution on the speed and other variables in relation to the quantum and photocatalytic theories of grain sensitiveness. A correlation between the exposure density curve and the size frequency curve was found for certain conditions.

Journ., Franklin Institute, Oct., 1922, *p.* 485.

In later papers on the size-frequency distribution of silver halide particles, Messrs. Sheppard, Trivelli and Wightman describe two methods of microscopically examining and studying the size-frequency distribution. Size-frequency curves are given for the principal types of emulsions. A comparison of the size-frequency, and the sensitometric characteristics show that there is a general increase in speed with an increase in the average size and range of size of the grains composing the emulsion. Beyond this fact nothing can be definitely stated at this time. *Journ. Phys. Chem.,* 1923, *p.* 1.

Drs. Higson and Toy find that gamma infinity (maximum contrast) is chiefly dependent upon the size of the silver halide grains and their uniformity, decreasing with increasing size of grain and with increasing variation in the grains. This explains the reason why process plates having small nearly uniform grains may be developed to a higher degree of contrast than fast plates in which the grains are larger and more varied in size. The authors also predict that the value of gamma infinity can be estimated from a measurement of the grain sizes and distribution.

Photo. Journ., 1923, *p.* 68.
Sci., Tec. and Ind. Photo., 1923, *p.* 13*T.*

In a paper on the theory of the characteristic curve of a photographic emulsion Dr. F. C. Toy after an investigation, for the most part along theoretical lines, concludes that there is no evidence for the assumption that the light-sensitive material in the various sized grains of a fast emulsion is of equal sensitiveness. From which it appears that aside from differences in size or projection there is an inherent difference

in sensitivity among grains of different size owing to a difference in their light sensitive centers.

Phil. Mag., 1922, *p.* 352, *Part II.* *Phil. Mag.*, 1923, *p.* 715.

The essential condition for the developable condition of an emulsion is the existence of "centers" within the grain from which point development begins. These centers have been considered as (1) the product of the exposure, and (2) as a part of the emulsion formed during the process of manufacture, the production of which is probably the function of the ripening process. Clark has attacked the matter by the use of a solution of sodium arsenite which brings about development without light exposure, and he comes to the conclusion that the developable centers are present before exposure. *Photo. Journ.*, 1923, *p.* 230. *Brit. Journ. Photo.*, 1923, *p.* 227.

In an interesting paper before the Pictorial Photographers of America, Dr. E. P. Wightman of the Eastman Research Laboratory explains in a simple and understandable way the mysteries of the investigations which he and his colleagues of the Laboratory have been carrying on in relation to plate sensitiveness, the mechanism of exposure and the structure of emulsions. To those who fail to grasp what all this later work on sensitivity and exposure theories is about we recommend this paper.

Amer. Photo., 1923, *p.* 329.
Brit. Journ. Photo., 1923, *pp.* 491, 507.

Those who have wished for a comprehensive yet understandable review of the various theories regarding the structure of photographic materials, the mechanism of exposure. grain centers, light quanta, etc., will find their desire fulfilled in a paper by Dr. C. E. K. Mees which describes the work that has been done on the subject, the principal conclusions that have been reached and suggestions on particular phases of the subject which are under investigation or in which investigation is needed.

Journ. Frank. Inst., 1923, *p.* 1.
Brit. Journ. Photo., 1923, *pp.* 139, 160.

SENSITIZERS AND DESENSITIZERS

A new desensitizer 2-*p*-Dimethylaminostyrylpyridine is announced by Mills and Pope. The sensitizing action extends almost unbrokenly from the blue to 5600 A; then the sen-

THE DANCER. E. J. BROWN.

sitizing action falls off rapidly, ending at 6200A. The blue green region is not marked by a drop in sensitiveness as is the case with most other sensitizing dyes.

Journ. Chem. Soc. (London), 1922, *p.* 946.

The constitution of several new dyes formed of one benzothiazole and one quinolin nucleus are described by Mills and Braunholz. They are all red compounds which act as green sensitizers, giving extra sensitiveness up to about the D line. Several have slight sensitizing bands in the orange.

J. S. C. I., 1922, *p.* 2004.

Dr. C. E. K. Mees and G. Gutekunst have described three new color sensitizers, namely: Kryptocyanine, Acetaminocyanol, and Naphthacyanole. The first is perhaps the most powerful known sensitizer and extends far into the red to about 900$\mu\mu$ without conferring any green sensitiveness at all. Acetaminocyanol when added to the emulsion during preparation gives a maximum at about 730$\mu\mu$, but when used as a bathing solution the positions of the maxima vary. Naphthacyanol shows a maximum at 690$\mu\mu$, but is not as efficient as a green sensitizer as Pinacyanol. *Brit. Journ. Photo.*, 1922, *p.* 474.

Dr. E. Konig and R. Schuloff have been able to prepare several new dyes which may act either as sensitizers or desensitizers depending upon the position of the substituted groups. The composition of the new dyes is not disclosed by the authors who presumably intend to keep it a commercial secret.

Photo. Korr., 1922, *p.* 43.

The red sensitizing action of potassium iodide which was observed by Renwick in his 1920 Hurter lecture has been investigated with a wide variety of emulsions by Dr. S. E. Sheppard. The action is by no means uniform, as some emulsions are strongly red sensitized, while others show little or no sensitizing. Evidence is brought forward to account for the red sensitizing action of potassium iodide as due to the action of the iodine ion of silver in altering the colloid silver. *Photo. Journ.*, 1922, *p.* 88.

J. G. F. Druce has confirmed Luppo-Cramer's statement regarding the desensitizing powers of oxidized amidol, and discusses the chemistry of the subject.

Brit. Journ. Photo., 1922, *p.* 296.

SILVER BIRCHES. LOUIS J. STEELE.

A. Steigman as a result of some experiments supports Luppo-Cramer's oxidation theory of desensitizing action. He believes that it may be possible for the desensitizer and the silver halides to form some new compound which is insensitive to light, and intends to make further measurements along this line. *Photo. Ind.*, 1922, *p.* 469.

According to H. Blackstrom, ferrous oxalate developers are powerful desensitizers, and, after a short immersion in a ferrous oxalate developer, development may be continued in a bright white light. It is especially suited to autochroms. According to Luppo-Cramer the desensitizing action is more likely to be due to the oxidation products than the developer itself. *Photo. Rund.*, 1922, *p.* 181. *Ibid.*, 1922, *p.* 202.

A method of using phenosafranine without staining of the gelatine is described by H. G. Cleveland. The following formula is recommended:

A.

Phenosafranine	20	grs.
Water	8	ozs.

B.

Formaline 37%	¼	oz.
Sodium sulphate dry	1	oz.
Water	9	ozs.

To 9 ounces of B add 1 ounce of A. The solution keeps well.

Amer. Photo., 1922, *p.* 756.

DEVELOPERS AND DEVELOPMENT

The constitutional and preparation of metol (monomethyl-paramidophenol sulphate), which was for such a long time a puzzle to chemists, has been described by W. F. A. Ermen. The poisoning action of metol has been traced to a compound, dimethyl paraphenylene diamine, the elimination of which can be effected without injury to the product, and which results in a metol with absolutely no poisoning action. Johnsons announce that all of their metol is poison free.

Photo. Journ., 1923, *p.* 223.
Brit. Journ. Photo., 1923, *pp.* 169, 181.

Dr. Scott finds that a very small amount of hydrochinon added to a sulphite of soda solution acts as an efficient pre-

SOUTH AISLE, YORK MINSTER. J. E. ADNAMS.

servative. He recommends about one part of hydrochinon to each 500 parts of sodium sulphite. A solution of sulphite so preserved deteriorated only about 12 per cent in four months. The amount of hydrochinon added is too small to have any appreciable effects on the developer.

Brit. Journ. Photo., 1923, *p.* 73.

The effect of the addition of potassium ferrocyanide to developers has been reported on by the Research Laboratory of the Eastman Kodak Company with the conclusion that with metol-hydrochinon, hydrochinon, and pyro an addition of up to 5 per cent of potassium ferrocyanide has no valuable effect on contrast, density, fog or shadow detail.

Report No. 1484 *Research Lab.*

The action and use of alkalies in development has been the subject of a communication by Prof. E. J. Wall to American Photography. *Amer. Photo.*, 1922, *p.* 481.

Those who have been troubled with uneven action of developing and other solutions when used diluted in tanks will be interested in a paper dealing with Convection Effects in Photographic Bathing Operations without Agitation by E. R. Bullock of the Eastman Research Laboratory.

Brit. Journ. Photo., 1922, *p.* 110.
Amer. Photo., 1922, *p.* 162.

A chart is given in American Photography by A. S. Little which shows the time of development at any temperature from 10-25 degrees Centigrade for a temperature coefficient of 1.9. *Amer. Photo.*, 1922, *p.* 734.

PRINTING PROCESSES

Carbro (carbon from bromides) is still attracting attention in England, although it seems to have been adopted only here and there in this country. It well deserves trial, as it gives carbon quality and range of color with but little more trouble than the ordinary developing papers. The carbro worker will find a very interesting table showing the effect of variations in the composition of the sensitizer and time of immersion on the finished result in a paper by Mr. A. H. Hall in the British Journal. *Brit. Journ. Photo.*, 1922, *p.* 783.

Those interested in the old processes of solar printing will

IN ISOLA BELLA,
LAKE MAGGIORE, SWITZERLAND. Lionel Wood, F.R.P.S.

find a comprehensive review of the various methods and practical directions for their use in an article in the pages of American Photography for 1923 by E. J. Wall.

Amer. Photo., 1923, *p.* 156.

A modification of the usual kallitype process whereby platinum like blue-black tones may be obtained is described by James Thomson. Formulae are also given for making a sepia kallitype paper. *Amer. Photo.*, 1923, *p.* 422.

E. Guttmann describes a new method of color rendering in the bromoil process in which the print is inked up so as to secure full detail in the shadows and half-tones and then transferred to its final support. The transferred print is then gone over before drying with very thin coats of transparent pigments as Indian yellow, light or dark carmine, Payne's Gray, etc. (Why not a two color scheme by double transfer? Abstractor) *Photo. Rund.*, 1922, *p.* 197.

A method of measuring and numerically expressing the degree of glossiness or mattness of the surface of photographic papers has been worked out by Jones and Fillius of the Eastman Research Laboratory. The vague meaning of gloss, matte and semi-matte is pointed out and the desirability of expressing this numerically is pointed out. A special type of photometer called a goniophotometer or "gloss meter" was evolved for the measurement of the distribution of the light reflected from a surface and the methods necessary to eliminate errors of measurement are discussed. Gloss measurements are given for a number of papers and the readings for typical gloss, semi-matte and matte papers are given.

Brit. Journ. Photo., 1922, *pp.* 216, 229.

The suggestion of a uniform formula for gaslight paper developers for different papers is not new but one of the best that we have seen is the method adopted and described by Wm. Jordan in American Photography. By means of these stock solutions he advises one can prepare a developing solution for several brands of paper, which is almost identical with the formula advised by the manufacturer.

Amer. Photo., 1923, *p.* 139.

TONING PROCESSES

A new method of sulphide toning has been worked out by Mr. W. B. Shaw. The following is the formula:

A.

Calcium chloride (Cryst.)	460 grains
Ammonium chloride	150 grains
Ammonia .880	2¾ fl. drms.
Nitro-benzene	2¾ fl. drms.
Water	35 fl. oz.

B.

Sodium sulphide	150 grains
Water	3½ ozs.

For use take 85 minims B to every 3½ ozs. of A (5 cc B to 100 cc A). The tone is colder than that secured by bleaching and sulphiding in the usual way. *Brit. Journ. Photo.*, 1923, *p.* 267.

Mr. E. J. Wall contributed an exhaustive account of the various printing processes using iron salts to the pages of American Photography last year. The blue print, positive blue print, sepiatype, ink and kalaitype processes are fully described together with several minor processes.

Amer. Photo., 1922, *pp.* 677, 766.

Several well known methods of green, olive and red toning have been modified and improved by Namias. The paper is too long to quote details. *Prog. fot.*, 1922, *p.* 85.

The Eastman Research Laboratory report that the effect of drying the print before bleaching in the ferricyanide-bromide bleach preparatory to sulphiding is to shift the tone slightly towards yellow. The effect naturally varies with different papers. The duration of washing does not seem to have any effect nor does the time required in soaking after drying.

Abst. Bull., 1923, *p.* 18.

W. Ermen calls attention to the use of *p*-diamines or *p*-aminophenols and the oxidising properties of the latent image to secure blue tones by direct development. The developer used is as follows:

Dimethyl-*p*-phenylenediamine	6 grams
Sodium sulphite Cryst.	20 grams
Sodium carbonate Cryst.	20 grams
Water to	1000 cc.

THE LEA. AMELIA H. MC LEAN.

To 100 cc of this developer is added 33 cc of a solution of
 a-naphthol 14.5 grams
 caustic soda 8 grams
 Water to 1000 cc.

A normally exposed bromide print or lantern slide develops to an indigo-blue image when developed in this mixture. Black and white prints may be bleached as for sulphiding and treated with the above solution. *Brit. Journ. Photo.*, 1923, *p.* 47.

An interesting paper on iron, uranium and copper toning by A. Cobenzl is found in the Festnummer of Photographische Korrespondenz. The prints after fixing and washing are bleached in the following:

Water	100 cc
Potassium ferricyanide	5 grams
Strong ammonia	10 cc

After bleaching they are washed and immersed in one of the following baths according to the tone desired:

Blue tones.	Water	100 cc
	Iron ammonia alum	0.5 gram
	Pure conc. hydrochloric acid...	5 cc
Brown and Red.	Water	100 cc
	Uranium nitrate or acetate.....	0.5 gram
	Pure conc. hydrochloric acid...	5 cc
Red to Pink.	Water	100 cc
	Cupric chloride or sulphate....	0.5 gram
	Pure conc. hydrochloric acid...	5 cc

Green tones may be secured by toning first in uranium and following with the iron toning solution.

Photo. Korr. Festnummer, p. 11.

The control of color in lantern slide making by the addition of thiocarbamide to the developing solution and the effect of temperature, exposure and composition of developer on the tone is the subject of a table in the British Journal of Photography for 1922, p. 595.

The subject of blue toned lantern slide by the use of a developer containing thiocarbamide is also the subject of a paper by B. T. J. Glover. *Brit. Journ. Photo.*, 1923, *p.* 135.

A. Lumiere, L. Lumiere and A. Seyewetz have further in-

WINTER LANDSCAPE. ING. A. NIKLITSCHEK.

vestigated the properties of quinone compounds and their application in photography as intensifiers and reducers. Toluquinone is found to be an excellent toning agent producing a purple tone very similar to that obtained with gold.

Brit. Journ. Photo., 1922, *p.* 784.

The chemistry of toning with stannous salts is the subject of a paper by J. G. F. Druce. *Brit. Journ. Photo.*, 1922, *p.* 433.

MISCELLANEOUS

M. Monpillard has disclosed a method of hypersensitizing plates worked out by him as early as 1912. The plates are bathed immediately before use in a solution of silver chloride dissolved in ammonia. The plates do not keep and must be used within a few hours. Several examples of extremely short exposures under adverse conditions accompany the paper. It is said to be especially adapted to Autochrom plates.

Bull Soc. Fran. Photo., 1922, *p.* 90.
Brit. Journ. Photo., 1922, *p.* 399.

Dr. S. E. Sheppard has determined that the characteristic reducing action of ammonium persulphate is not necessarily due to the presence of chloride ions. Increasing concentrations of acid and silver ion speed up, but do not eliminate, the characteristic action of persulphate. Bromide acts similarly to chloride. Evidence favors the dispersoid theory of reduction as advanced by Luppo-Cramer. *Photo. Journ.*, 1922, *p.* 321.

The research laboratory of Il Progresso Fotografica has found that strong yellow stains due to insufficient fixation or washing may, in a great many cases, be removed by the following treatment. Immerse the negatives in a clearing bath of mercuric iodide and iodine made by adding potassium iodide to a 3% solution of mercuric chloride until the red mercuric iodide had completely redissolved followed by the addition of 10 grams of iodide per litre.

Il. Prog. Fot., 1922, *p.* 181.

In American Photography, F. M. Gentry describes his methods of photographing by infra-red light. A filter of mandarin orange between two pieces of cobalt glass is used. The transmission is stated to be about 6500 A. U. Plates may be made sensitive as far as 9500 A. U. by supersensitizing with alizarine blue S and silver nitrate. Some illustrations of

KENNETH ALEXANDER.

natural subjects photographed by infra-red illumination are given. *Amer. Photo.*, 1922, *p.* 302.

The Research Laboratory of the Eastman Kodak Company recommend the following procedure for successfully stripping the film from glass plates: First coat the film with a 6% solution of gelatine. When the gelatine coating is dry harden the negative in a 50% solution of formaline for 10-15 minutes and then dry by heat if desired. The portion to be stripped is outlined by cutting through the emulsion with a knife, and the negative placed in a 15% solution of acetic acid, which loosens the emulsion so that it may be pulled away from the support. After stripping the film is laid on a clean sheet of glass to dry. *Laboratory Report No.* 1397.

Tartrazine has been advocated as an indicator of complete washing by Hickman and Spencer. It is found that hypo washes out about ten times as fast as the dye which may thus be used as an indication of the time of washing necessary for complete elimination of hypo. The efficiency of various types of washers was also investigated by this method.

Photo. Journ., 1922, *p.* 225.

In the second part of the paper on the washing of photographic products by Hickman and Spencer the authors describe a new electrical resistance method of determining the presence and amount of hypo dissolved in water. The method is undoubtedly the most accurate method in practice that we have of determining the presence of hypo. While suitable for laboratory use in its present state it is not so suitable for the practical photographer, and is undergoing alterations towards this end. *Photo. Journ.*, 1923, *p.* 208.

Luppo-Cramer describes a new method of making reversed negatives. A transparency plate is exposed to artificial light for a certain period of time which must be found by experiment. It is then bathed for 1½ minutes in

Potassium bromide	10	gr.
Phenosafranin	0.2	gr.
Water	1,000	ccm.

Dry without washing. The plate is then exposed from 25-50 times as long as ordinarily necessary and developed as usual. The only source of error is in determining the first exposure.

SIDNEY V. WEBB.

When this is found the production of reversed negatives is sure and simple. *Photo. Rund., 1922, p. 269.*

A practical application of the Russel effect has been found by Mr. Raymond Davis of the Bureau of Standards. Using Seed 26x and 30 plates, Mr. Davis has been able to secure intelligible copies of charred papers which otherwise could not be deciphered. Films or papers did not answer the purpose for some reason which could not be determined.

Sci. Papers Bur. Stand. No. 454.
Brit. Journ. Photo., 1923, p. 205

GLACIER, BRITISH COLUMBIA. E. MILDRED BOWER.

SUNSET ON GRASS LAKE. J. A. SINGLER.

HINTS—PERHAPS HELPS

By COL. JAS. A. ANDREWS

I DO not think that I am naturally lazy, but when I see a man sit down before a pair of scales with numberless bottles and cans, then most laboriously tear up tissue paper to make said scales accurately balance, a feeling of lassitude almost overpowers me. To get away from that nuisance, many amateur photographers buy their chemicals ready mixed either in powder form or tabloids, but if one has considerable work to do, the expense counts up quickly. While in Paris I really learned the true worth of Amidol, Dianol, or Diamidophenol, call it what you wish, and since then making up developer for plates, films or paper is a simple matter.

I use the French formula for everything:

Sodium Sulphite—desiccated	6 grams
Amidol	1 "
Water	200 ccm.

Those metric names may look difficult to some, but they can be forgotten, as scales are never used. That formula reduced to its simplest terms reads:

Sodium Sulphite—desiccated......	1	teaspoonful
Amidol	½	"
Water	7	ounces, or a

little less than an ordinary glass full, for the average glass holds about 8 ounces. Get a set of those aluminum spoons to be had at any hardware or ten cent store, a can of sulphite, a bottle of Amidol, and you are all set for developing either at home or travelling. Do not forget to stir rapidly as the sulphite is poured into the water. It will dissolve in a few seconds. Do not use any bromide for plates or films, but a little may be useful for paper.

Develop films, either cut, or roll, or film pack, 4¼ minutes in total darkness, rinse, fix, and see what beautiful negatives you get. For Standard Orthonon plates I develop 2 minutes at about 65°. Do not judge a negative by its appearance—

THE STEP PYRAMID. COL. JAS. A. ANDREWS.

make a print and see what you really have. If the print is flat, develop longer, and vice versa, remembering that the density depends on time of exposure, while the scale of contrast, or range of tones, depends on the time of development. Should your negatives be very dense and require a long time to print, reduce the exposure if the tone scale is correct.

Amidol will do everything that any other developer will do except just one thing—it will *not* stain the negative, and since there is no strong alkali used, frilling is greatly prevented

Hypo. Ordinary pea crystal hypo has almost the same weight as water, so no scales are ever necessary. Measure out in any glass as much hypo as you wish to use, and then add four times that amount of water. This will be a 25% solution as is ordinarily recommended.

Bromoil. I am aware that there are more than 57 varieties of bleaches, each one of which is by far the best, but if you are having trouble with this most artistic and interesting process, try the following chloride formula:

Copper Sulphate Crystals	40 grams
Common Table Salt	200 "
Potassium Bichromate Crystals..........	5 "
Water	1000 ccm.

When the above is dissolved, add just enough hydrochloric acid to clear the solution. Working bath is made by using one part of above stock and two parts water.

TERPSICHORE. ALFRED S. WILLSON.

CALCULATING EXPOSURE FOR DAYLIGHT ENLARGING

By C. R. LOWE

PRESUMING your daylight enlarging apparatus is made according to the most approved plans, the next question is "How long shall the exposure be for a required diameter of enlargement from a given negative?" Daylight is exceedingly variable, that is its only drawback. It varies with the season, with the hour and kind of day, and there may be momentary variation. If the sky is "afflicted" with passing clouds, my suggestion is don't make enlargements. Choose a time when the sky is clear or cloudy. Any other variable is cared for by the method of calculation.

Close beside the camera which is backed up to the window, make a door in the framework which darkens the window. You will need some white light in a handy place, also a safelight, so make this door carry the safelight, say 5 x 7 or 8 x 10. Always open the door wide when using in connection with this time calculation. This will afford you a constant factor. Another, is the amount of light which comes through the door as compared to that which comes through the enlarging apparatus. Always take the same position with reference to the door when making the contact print.

By experiment find the correct exposure for a correctly timed one and a half diameter enlargement. We will say it is fifteen seconds at F/11. I find that is as fast as I care to work when I use bromide papers with an ordinary light. Opening the door wide find how far back from the door you must be to make a contact print from the same negative as used in the enlargement on the same grade of paper and developed in the same solution. Note the position of the printing frame with reference to the door, whether it is above its level or below, or if to one side. Use this same position in making all contact prints.

Now, conversely, the time for making a contact print will be the time for a one and a half diameter enlargement from

THE CRUCIFIX. Louis J. Steele.

that negative on the same grade of paper. I find it much easier and quicker to make a contact print or two than to experiment each time with a "pilot" enlargement. The contact print is usually made on pieces left from trimming down large sheets.

For the different diameters you will find the following rule is applicable: The time for the enlargement is to the time for the one and a half diameter enlargement as the square of the diameter of the enlargement is to the square of the one and a half diameter : T : t : : D^2 : d^2. It is always measured by the time for the contact print. Then we have for a three diameter enlargement T : 15 sec. : : 9 :2.25—60 sec. This is the time for the three diameter enlargement. This is four times the number of seconds required for the one and a half diameter enlargement, and is another constant factor.

Working for the different degrees of enlargement you find the following table which I have used for a half dozen years with uniform success:

Diameter of Enlargement	Factor
1½	1.00
1¾	1.36
2	1.78
2¼	2.25
2½	2.78
2¾	3.36
3	4
3¼	4.69
3½	5.44
3¾	6.25
4	7.11
4¼	8.03
4½	9
4¾	10.03
5	11.11
5¼	12.25
5½	13.44
5¾	14.69
6	16
6¼	17.36

This table gives the factors in decimals for the sake of

exactness, but one can safely use whole numbers and fractions as 1, 1⅓, 1¾, 2¼, 2¾, 3⅓, and so on for simplicity, because insofar as I have observed the latitude of the papers will care for this percentage of error, and more.

The general rule is, find the time for making a correctly timed contact print on the paper to be used. Multiply this time by the factor corresponding to the diameter of enlargement to be made. This will give you the correct exposure time for the enlargement at F/11. If the light is strong and you wish to slow down to F/16, double this time; if it is weak and you would open to F/8 divide by 2; if to F6/3 divide by 3.2. Any error made in timing the contact print will show in the enlargement.

It will be found, that soft thin negatives will give the best results when the light is not so strong, so use a cloudy day for enlarging soft negatives. Mr. John Boyd points out in the 1921 issue of the *Annual* that ray filters will work wonders in making enlargements from thin negatives.

Copy the table given and tack it up where it can be seen by the safelight. It has taken all the worry and most of the guess out of the daylight enlarging process for me. All the variables save that of shadows cast by scudding clouds are accounted for by the calculation.

I have used this method of computation under almost all conceivable conditions and combinations, even to having the sun shine directly onto the ground-glass which hung outside the window as a diffuser. This same scheme may be used in determining the length of exposure for enlarging by electricity by making a contact by the light which comes through the lens, or through an open door in the lamp house. However, as the electric light is constant there is less need for the calculation.

VISTA OF MANHATTAN. JOHN ALLEN.

SIMPLIFIED CARBRO

By WILLIAM A. ALCOCK, LL.B.

MANY of the troubles attendant upon the successful manipulation of the carbro process may be traced to the difficulty of determining the exact time of immersion in the formaldehyde bath.

It was my good fortune on two occasions during the past year to visit the Autotype Company Plant at Ealing. Among other interesting things there, I found that they have been experimenting with a combined bath for carbro with a view of overcoming the difficulties above mentioned. This combined bath is made from the two standard stock solutions, which, at the risk of boring the readers of this publication, I will repeat, as follows:

Stock solution No. 1

Potassium Bichromate	1 oz. or 10 grammes.
" Ferricyanide	1 oz. or 10 grammes.
" Bromide	1 oz. or 10 grammes.
Water	20 ozs. or 200 C. C.

Stock solution No. 2

Glacial Acetic Acid	1 oz. or 10 C. C.
Hydrochloric Acid (pure)	1 oz. or 10 C. C.
Formaldehyde 40 per cent......	22 ozs. or 220 C. C.

The working solution is made up as follows:

No. 1 stock solution	16 ozs.
No. 2 " "	1 oz.
Water	48 ozs.

or smaller quantities in the like proportions. This solution should be made up fresh each time it is used. The print should be immersed for three minutes in this bath. It is then ready for use. As all of our readers are presumably familiar with the working of the carbro process, I will not burden them with further details. Suffice it to say that the method above outlined has the advantage of simplicity but has the disadvantage, if disadvantage it be, that in the use of it a good bromide print is essential to a good carbro. It lacks the control of the old method, but, given a good bromide print, a beautiful carbro will result.

BILL. WM. A. ALCOCK.

Figure 1.
Illustrating article "Soft Pictures From Sharp Negatives," by William Noyes.

SOFT PICTURES FROM SHARP NEGATIVES

By WILLIAM NOYES

THE growing demand for soft focus photographs gives interest to the problem of making such photographs from "sharp" negatives. The fact that makers of soft focus lenses mention the ability of their lenses to do this by projection is further evidence of the demand.

It is quite possible to make a "soft" enlargement by projecting the light directly through a sharp negative on to the bromide paper, but there are drawbacks to this method. "Softness" in a photograph may mean simply a diffusion of outlines, and often this is all that such a photograph is. But a truly artistic soft focus picture has other qualities than this. For awhile they ran to an extreme in the production of a distinct halation.

When a subject is photographed direct this halation will show as a border of white running from the high lights over on the shadows. It follows that if a sharp negative is projected by a soft focus lens there will be a similar halation formed, only in this case the halo will consist of the blacks

Figure 2.
Illustrating article "Soft Pictures From Sharp Negatives," by William Noyes.

running over into the whites. Hardly anyone would consider this artistic or to be desired. Yet this is inevitable if the enlargement is to be made directly from the sharp negative by means of a soft lens. If the lens is stopped down enough to cut out the halation, all that remains is a photograph with slightly softened outlines. If that is all the photographer and his patrons want, there is nothing more to be said.

But to one who appreciates the shimmering luminosity to be gained by the use of the best soft focus lenses, a quality due to the difference between the visual focus and the actinic focus of the lens, it is of interest to know whether this quality can be obtained from a sharp negative.

It can, and in several ways.

1. First a positive has to be made. This may be either a transparency on a slow plate or film made by contact, or a silver print (on "print paper") by sun exposure.

The advantage of the transparency is that all the detail of the original negative can be preserved and the density and gradations can, with skill be controlled.

The advantage of the silver print is that it is cheap and the result can be watched and there is no guess work as to length of exposure. If there are clouds to be worked into a landscape, it can easily be done by printing them into the silver print. Then they are permanently fixed in the soft negative derived from that. Some sorts of retouching or of blotting out can readily be done on the silver print and the soft lens is likely to remove all evidence of such manipulation.

2. The next step is to photograph the positive. If it is a transparency the light is thrown from the projecting lamp through the transparency on to the sensitive plate or film, by means of the soft focus lens. If the silver print method is used, it is simply a process of copying.

In either case the degree of "softness" is under the control of the photographer. Such halation as there is will be correct, that is, whites will run over into blacks, not the other way round.

Here again the advantage of the transparency lies in a more perfect reproduction of detail than is possible by copying from a silver print. On the other hand, the copying from the print has the advantage of sureness of timing. With a little experimentation it is possible to know within a second

EVENING OF A STORMY DAY. W. H. Porterfield.

how long to expose the film to get the correct exposure. In this way one can make negative after negative, all having the same density and printing quality.

As to the best kind of plate or film to use, there may well be a difference of opinion. The writer has obtained the best results by using panchromatic films and photographing from silver prints through a 3K ray filter. From the resulting soft negative, either direct prints or enlargements may be made.

As to the time of exposure the following suggestions are offered: The equipment used was a 5 x 7 camera with an extension box. The light for copying consisted of four 25 Watt electric bulbs. The soft lens (12") was (usually) stopped down to F/11. Using this equipment a silver print made from a negative 1⅝ x 2½ (V.P.K.) illuminated as above and enlarged on the panchromatic film to about 3 x 5 required 6 seconds exposure. To copy a 5 x 7 "sharp" print on a 5 x 7 film required 3 seconds, and intermediate sizes corresponding exposures. Where this process of copying from silver prints is used, the operator will find it of advantage to develop by tank. Thus guess work is eliminated all the way through, (1) in the working of the print, (2) in the exposure of the film, (3) in its development.

An example of the results obtained by this method of making soft photographs is shown by a comparison between Figure 1 the original, and Figure 2, reproduced by the method described.

One great advantage of the above method of obtaining soft pictures is that the softness will be uniform through the whole picture. Assuming that the original negative has been made with the lens stopped down enough to bring all of the picture into good focus, the soft lens, in enlarging, will soften every part of the picture field near and far, will be equally diffused, or halated, and the degree of such halation is completely under control.

No. 1.

Showing "Light House" used as a printing apparatus, with printing frame on adjustable table, also showing light controlling switch.
Illustrating article "The Light House," by Wm. C. Settgas.

THE LIGHT HOUSE

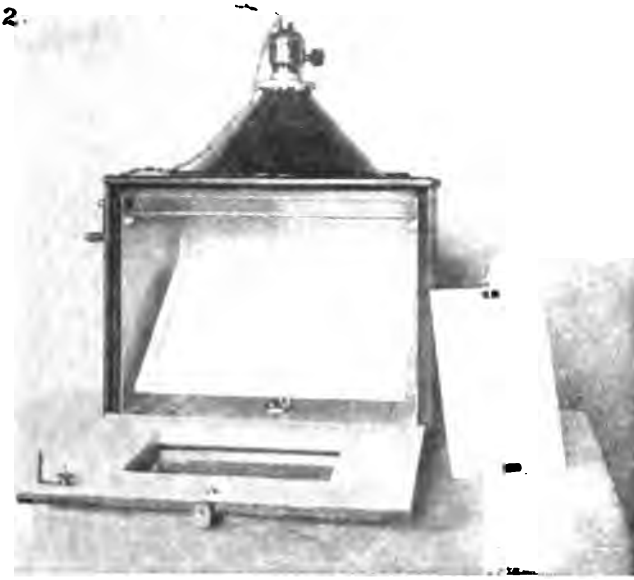
By WM. C. SETTGAS

THE "Light House," as I have named it, is a contrivance of my own, and was first designed for photo printing, but reconstructed to be the "Light House" for three distinct purposes; namely, printing, dark room lamp and enlarging.

As a printing box or apparatus, it is constructed on entirely different lines than that of any other, and requires the use of the ordinary printing frame which is loaded with the negative and paper, also masked if desired, and then placed inside the apparatus to print.

In my experience I found that the printing boxes on the market are all alike in one respect, and not what I think they should be, inasmuch, that only straight printing can be done

No. 2.



Showing "Light House" with table tilted toward window, of which inside shutter has been removed, when "Light House" is to be used as a darkroom lamp.

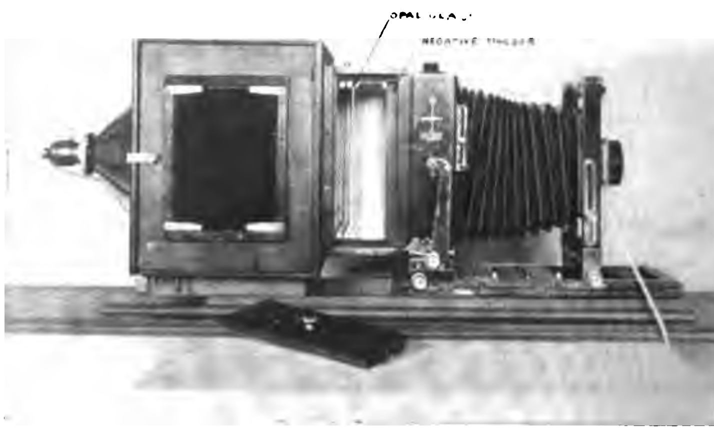
No. 3.

Showing "Light House" used as a darkroom lamp.

Illustrating article "The Light House," by Wm. C. Settgas.

with them. This is what I have tried to overcome, and think I have succeeded in doing. What I mean by straight printing is that the negative is always in one and the same position and level with the light, receiving the same amount of light over the entire negative. It is well known that all negatives cannot be printed in this manner, for the reason that some have more or less density in one corner, end or side, and therefore that portion requires more or less printing in order to get the best print possible.

No. 4.



Showing "Light House" and extra box inserted between "Light House" and camera, as used for enlarging. Also side door or cover of extra box removed, showing opal glass and negative holder.

Therefore, it will be noticed that in this printing box of mine, is a table on which the loaded printing frame is to be placed, and this table can be tilted at any angle so as to give any portion of the negative more or less light that might be required, resulting in a better print than you could get by straight printing. Then again, the door may be left open while printing, and any dodging that you might want to do can be done.

I do not claim anything for speed in this manner of printing, but I can and do say that one good print is preferable to three or four poor ones, possibly made in the same length of time.

The light in the box is controlled with the opening and

LAKE HOLLYWOOD, ORLANDO, FLA. CHARLES W. DOUTT.

closing of the door, and can also be controlled independently, if desired. In this door will also be noticed a window with 5" x 7" ruby and orange glasses, which will make a dark room lamp by removing the shutter in the window, on the inside of the "Light House." The ruby and orange glasses can also be removed, and any combination of safe colors inserted in a moment's time. It may also be necessary to change the light bulb for a smaller one when using as a dark room lamp, as less light is required than when printing or enlarging.

Now we can take the "Light House," place it on its side and use it for enlarging, by removing the bottom together with the tilting table and inserting a separate box which fits between it and the camera. This box contains an opal glass which is adjustable for securing the proper light. It also contains the negative holder, and negative from which the enlargement is to be made, holding negatives up to 5" x 7" sizes, horizontally or vertically.

INDIAN MAIDEN—MISSION RANGE. J. E. FOSS.

A COW-PUNCHER. FORMAN HANNA.

SOME RANDOM THOUGHTS ON PHOTOGRAPHY

By MARK W. STEVENS

I HAVE often wondered why it was that so few photographers use the metric system in compounding their formulae. It seems as though they must be afraid of it, although it is the system that is used exclusively on the continent of Europe and wherever scientific work is done, the world over. It is the one *Universal* system of weights and measures.

It is a pure decimal system, and surely no American, accustomed to our decimal currency, would willingly change it for the English system of pounds, shillings, and pence. Take for example, the following formula:

Water,	500 cc's
Metol,	1 gm.
Hydrochinone,	1 gm.
Sodium Sulphite (cryst)	10 gm.
Borax,	10 gm.

This is double the amount we wish to make up, as one-half. or 250 cubic centimeters (cc's) is equivalent to about 8 ounces fluid measure. Also we are using sodium sulphite "dry" instead of the crystals as given in the formula. We divide our water by two making 250 cc's. Also the metol and hydrochinone, making them one-half gram (0.5 gm.) each. The dry sulphite, being twice the strength of the crystals, we divide by two and, also, as we are making but half the amount called for in the formula, by two again; or a straight division by four—results two and one-half grams. The borax is divided by two and the result is five grams; thus we have:

Water,	250 cc's
Metol,	0.5 gm.
Hydrochinone,	0.5 gm.
Sodium sulphite, dry,	2.5 gm.
Borax,	5.0 gm.

This division has all been done in the head. Just compare

IN THE GRAIN ROOM. O. E. Duroe.

the simplicity of this division, you who have divided formulae in the English system of grains, scruples, drams, and ounces.

The bothersome problem of percentage solutions is immediately smoothed out as percentages are decimal. For instance, we wish between three and four ounces (100 cc's) of a 10% solution of some salt. We weigh out 10 grams of our salt and dissolve in part of the water and then bring the total bulk up to 100 cc's. Simple, isn't it?

The units of the system are the cubic centimeter (or cc.) for liquid measurement and the gram (or gm.) for weight. The cubic centimeter is the one one-thousandth part of a liter and the gram is the one one-thousandth part of a kilo. Also, one cubic centimeter of water (pure distilled) weighs one gram.

There are many tables published for converting metric formulae into English, but it seems to me too bad that there has been almost nothing done in the way of conversion tables for converting English formulae into the metric.

I am constantly being asked about by the novice "When shall I stop development?" "I don't want to tank more than three or four plates, but I do want to be just as sure of the results." The answer is quite simple. There are two methods of arriving at the desired result; one is the Watkins "Factorial" method, and the other is practically tank development carried out in the tray. This latter method has been worked out by Wallace. It consists, in the main, of a table across the top of which are a series of numbers from one to ten representing degrees of contrast. Down the left side of the table are a series of temperatures covering the normal range at which development is likely to take place. At the intersection of any temperature and contrast factor will be found the time of development for that degree of contrast with the special developer with which the table is to be used. Wallace has worked these tables out for a pyro and for a metol-hydrochinone developer. The subject is fully treated, giving both tables and formulae, in the Photo-Miniature No. 168, "Modern Methods of Development."

Have any of you been using the Graf "Variable" lens? It is a source of great interest and pleasure to the user. It is, in fact considered by the writer the most perfect all-around lens that the opticians have yet made. Just think of having

in one lens a perfect anastigmat working at an aperture of F/3.8, and a whole series of soft-focus lenses, the softness of definition being absolutely under your control. You make your adjustment for softness according to your judgment as you study your subject on the ground-glass: and the great advantage is that what you see on the ground-glass you will see in your negative, provided that the registration of your plate-holders is accurate.

In this connection I would remark that it is always best to check this registration, as I bought some holders a while ago and had been somewhat puzzled as to some of the negatives that I was getting until the other day I had occasion to check them. Out of the nine holders one registered perfectly, two were quite close enough for all practical purposes, and the other six were out of register sufficiently to make a marked difference between what you saw in the ground-glass and what was secured in the negative. This was most marked in soft-focus work. Probably all nine of the holders would prove perfectly satisfactory with a F/8 R.R. lens, but when using an anastigmat at F/4.5, or a large aperture soft-focus lens, the lack of perfect registration was sufficient to make results uncertain. And these holders were all supposed to be standard American registration and, while made by different firms, were all marked as being for use in the same cameras.

LOU SWEET.

A. S. WEINBERG.

ARTISTIC PHOTOGRAPHY

By EDNA OSBORNE WHITCOMB

IN this busy age of commercialism, some of us occasionally ask ourselves this question, is photography to rank as one of the fine arts, or is it always to have an insignificant place in relation to the pictorial world? In the last few years a noticeable advance has been made in the discovery of new possibilities in artistic photography, yet much still remains to be done before it is universally recognized as an art. Remarkable improvements in material and appliances are succeeded by an increasing interest in the technical and artistic manipulation of these tools of the trade, promising a brilliant future for the camera as a means of producing works of art.

Photography has now reached the stage where the public is no longer satisfied with the work of that class of picture makers known as "push buttoners," whose aim is to get a dead sharp negative with every possible detail. It is the revolt against this mechanical work and the yielding to the desire for individuality in treatment of subject, beauty of composition, and importance of expressiveness in a picture, that has brought art and the camera into closer relationship.

One distinction between artistic and inartistic photography appears in the statement, that the latter simply represents the shapes of the different objects that it collects, while the former presents the sentiment of the scene. In the inartistic photography, the picture is no more than a record, which makes no emotional appeal to the observer. But where the imagination has been stimulated, and where there is a harmonious relationship between subject and treatment, the result will be artistic.

To many people the words, artistic photography, simply mean "fuzzy, blurred pictures," and they fail to appreciate the work, because they cannot understand the motive which inspired the artist to make the picture. The camera is no longer the master, but only the instrument that is regulated by the mind of the individual who manipulates it, and it is his

ACROSS THE MARSH. GEORGE STEELE SEYMOUR.

aim to picture his personal impressions, and give a true translation of Nature's different moods. If the observer wishes to appreciate the result, he must first think of the artist and discover what particular thing he has tried to express. Every picture should have one main thought to which all parts are subordinate; nothing in any picture should take away from the main point of interest, and so it is that details are often entirely omitted, for they are as destructive to some pictures, as long, tiresome descriptions are to the progress of the plot in a story. But even when the observer knows what to look for and understands the picture's relation to a special purpose, there is still more for him to do, as he has to learn how to see.

He often looks around in a room and observes the play of light on different pieces of furniture. Not one of the objects are clearly defined, for he is interested in the study of high lights and shadows. He sees a combination of light, color, and shadow, whose forms, though very indefinite, are enough to suggest what they really are, and he does not see the details of an object until he stares at that particular object and his eyes are fixed there, its surroundings and other articles in the room are more or less indefinite; and so it is that this so-called "blurred" photography is gradually becoming popular with photographers, who make it their aim to have pictures emphasize one particular thing.

The desire to express one's feelings is the main purpose for making a picture, and its character depends upon the temperament of the individual. A popular subject for gaining artistic effects, is the picturing of a flock of sheep, as they are being driven to a certain place; and in this subject, as well as in countless others, there have been inartistic as well as artistic results. When all is left to the camera, it can only record the instant of the exposure and the result is a snap shot of sheep running along. Although the position of the legs is accurately reproduced, there is danger of distortedness to the human vision, for the eye cannot perceive this position without a certain strain, and so it is out of place in artistic work. But the picture of the sheep in the soft finish, where the effects of atmosphere and light and shade have been studied, is the one which will contain sentiment and feeling, and as a whole will be pleasing. Where there are no hard lines and the flock of sheep is seen as a mass, the animals have movement and

MISS KATHERINE BELCHER. F. MILTON ARMBRUST.

expression; they seem to be on the march. The sense of progression would have been lost, if each animal had been pictured definitely, for the appearance of moving objects loses its definiteness.

Artistic photography is the result of picturing movement in such objects as the swaying of leaves and branches, the ripples in water, the changes in facial expression, a coquette's glance, a baby's smile. In trying to represent anything of this nature, the thought of the moment before and after must be considered, for just as soon as a single instant is snapped, the result becomes lifeless and mechanical. As another example, take a picture of charging cavalry. How misleading it is to have all of the accoutrements of men definitely pictured; for how many of these can be seen when they are in motion. If detailed appearance of the squadron is desired, let the picture be as elaborate as possible; but if movement is the thing to be expressed, the number of buttons on a man's coat are of no importance whatsoever. This same trouble of too much detail arises when working with Nature, for so much must be suppressed in order to give emphasis to that which is expressive and pictorial. In a broad general way, details may be considered a hindrance to expression as they are of no particular importance, and usually add extra weight to pictures. At times, however, some details are needed and it is necessary to consider then how many are significant and valuable. Accessories are sure either to help or hinder, and it remains for the artist to decide just what their influence will be.

In portraiture, as well as in landscape, there is a great mass of lifeless productions, and the only way to decrease the number of these, is for the public to demand something more expressive and artistic. Slowly, a scattered few are beginning to want something more than a fashionable portrait made by some professional photographer, who works according to certain time-honored rules and regulations. But these professionals are not entirely to blame for their mechanical method as they strive to please the public; and as long as people are satisfied with a recognizable likeness, retouched and finished on a polished surface, till it is like nothing but a stiff, lifeless, wooden, or waxen image, there is no reason to try anything new.

This strictly commercial art has existed and flourished as

THEODORE EITEL.

long as it can and it will not be many years until artistic photography will be known and understood everywhere. In this future time when people look at a portrait, they will feel the atmosphere, see the effects of light, the revelation of character, instead of the commonplace and superficial prettiness. As the shape of features and lines on the face are constantly changing with every emotion, a likeness that emphasizes only certain features that attract the eye, is entirely insufficient. To make a successful portrait, it is necessary to reproduce not only the features, but the character of the subject. As friendship grows stronger, character becomes more familiar than complexion. Those who work in artistic photography realize this fact and consider it their task to catch the spirit of the individual. If they can succeed in doing this, they may feel quite confident that the exterior resemblance will be true enough.

The progress of artistic photography promises to develop the sense of beauty in the individual, for in order to make a picture, it is necessary to look for the beauty hidden among the common place things. While searching for this he comes to realize that the beautiful is everywhere, if he only knows how to recognize it. It may be found in the subtleties of tone in gray streets, the character of shadows, perhaps in the softening effect of atmosphere, but, regardless of the form it takes, the reward to searchers is so great that it more than repays all his toil and trouble. Perhaps only a few will always continue to look for this hidden beauty, but these few are the chosen ones, who worship the Spirit of Nature, and, advancing in the appreciation of art, reject the well-defined and seek the mysterious.

PORTRAIT STUDY, MR. MANSON. LOUIS ASTRELLA.

THE VALUE OF A SMALL CAMERA WHILE TRAVELLING

By J. A. ERNEST ZIMMERMANN, B.S.

UNDOUBTEDLY many articles have been written and will be written regarding the use and conveniences of our modern photographic appliances. Last autumn before leaving for the continent, the author was greatly puzzled in regard to the style and size of apparatus to suit his needs while travelling, as well as the use to which the negatives and prints were to be employed on his return. Of course the advantage of our modern system of photography as prepared for the professional, traveller, historian, practical amateur, vacationist, pleasure seeker, pictorialist, etc., is not of muscle or brawn but of mind.

Realizing this fact, it increased the difficulty to determine what best suited the trans-atlantic, continental and travelling needs for the coming year. Having several cameras of various types and sizes, it was decided the 2½ x 4¼ Kodak with a F/6.3 objective as the most convenient. Of course the decision was reached by the author just as others would have to decide for themselves, as it is only a matter of our personal opinion. No American films were procurable in the parts of Europe visited, and German film which are much slower, but of finer grain had to be employed with increased exposure.

Not only could the 2½ x 4¼ Kodak be employed advantageously, but also the Vest Pocket Kodak, only that the latter was found more inconvenient than the former. However, the negatives of the V.P.K. would require enlargement for lantern slides used in scientific work. This was the main reason for abandoning the V.P.K. and using the larger instrument. The negatives of the larger instrument can be used for contact slide printing without enlargement, and if the apparatus is equipped with a wide angle attachment, a portrait attachment, ray-filter, etc., it becomes a valuable asset to the investigator. Although the author prefers a 4 x 5 camera for scientific purposes and lantern slide work—with this size the advantage is that the

A QUIET CORNER.—(*Bromoil.*) WILLIAM N. MISURACA.

finished dimensions of the work can be judged at the start—he decided that it would be more difficult to be continually lugging a larger camera than the 2½ x 4¼, and thus employed this size in travelling, as no better one could be found for the needs of botany, wild animal life, etc. Hundreds of negatives were taken that are to be used for one purpose or another in scientific, and for educational purposes.

The value and possibility of the small camera with the use of a portrait attachment—since the same may be used in a much smaller space and compass—is shown by the photographic reproduction of Homeo Heidelbergensis (Figure 1), taken by the author at the Paleontological and Geological Institute of the University of Heidelberg. It is a photograph of the original, preserved at the University—not a replica. It is the lower jaw-bone in a perfect state of preservation and the oldest known remains of human existence today; found at Mauer in Baden near Heidelberg.

While the Graflex seems to be ideal for all speed work and wild animal life, the Kodak can be employed just as readily and as well with a little patience, the results obtained and produced being just as pleasing as those procured with the higher priced and more cumbersome instrument.

It is hoped that these few thoughts in the *Annual* will awaken the interest for the employment and use of smaller cameras with proper attachments.

Front View. Figure 1. Side View.
HEIDELBERGENSIS.

IN SANTA YNEZ MISSION CLOISTERS. EDGAR A. COHEN.

A CHEMICAL SENSITIZER FOR PAPER, SATEEN AND SILK

By ALFRED J. JARMAN

ASIDE from the ordinary processes for photographic portraiture by development, and the many varied formulae for developers, bleaching and sulphiding, there is a process for producing beautiful photographs of a delicate chestnut brown that will lend itself for profitable use by either the amateur or professional photographer.

This process is for direct printing and finishing by either gold toning, or by direct fixation, by which true sepia photographs may be produced of a permanent character, simply, easily, readily, and prove highly satisfactory to both producer or customer.

An excellent printing paper may be prepared with the solution about to be described known to artists and engravers as a silver print. These prints are used by the artist to sketch over the photograph with water-proof ink, and finally bleached, so that a print is produced in black lines upon a white ground over which the artist may carry out any designs by means of the air brush for halftone work, or for line engraving.

Letters may also be written for secret correspondence, the bringing out of the writing being known to the person the letter is sent to. The formula for making this sensitizer is as follows:

A.

Hot distilled water	4	oz.	fluid
Citric Acid (Crystal)	½	"	Troy

B.

Distilled water	8	"	fluid
Ammonia citrate of iron (The green variety)	2	"	Troy

C.

Hot distilled water	4	"	fluid
Nitrate of silver recrystallized	1	"	Troy

(Be sure and use distilled water.)

THE TARTAR DANCE OF THE CHAUVE-SOURIS.
Rabinovitch.

The above solutions are best made each one separate in clean glass chemical flasks. All being now dissolved proceed as follows: all these solutions should be prepared in the dark-room. Now, pour solution A into a clean amber colored glass bottle, add solution B, shake the mixture well, then add solution C, shake the whole vigorously, and filter through a tuft of absorbent cotton pressed lightly into the neck of a glass funnel into another amber colored glass bottle. This solution when quite cold will be ready for use. It will keep in good working condition for months.

The sensitizing of either paper, sateen or silk is accomplished as follows: For sateen or silk—If a print is to be made in the center of the fabric, then the center need only be sensitized, which is done by laying the fabric back down upon a sheet of clean glass and brushing over it with a flat camel's hair brush rubber-bound (a metal cased brush must not be used under any circumstances). Apply a small quantity of the sensitizer. The sateen or silk must now be suspended at the ends by a wood clip to dry away from all actinic light. When dry it will be ready for printing. Paper may be coated in the same way, bond paper is well suited. The best way, however, to coat paper is to place some of the sensitizer in a suitable tray, then by bending the paper like the letter J, allow the bend to touch the sensitizer by lowering the left hand, then by raising it so that the right hand lowers at the same time that the left hand rises, a very even and clean coating will result. Then suspend the paper to dry, and when dry it may be rolled upon itself and kept in a dry place until required for use.

The writer stores this kind of paper rolled in a tin case in the same way as platinum paper used to be stored. It will keep in good working condition for months ready at all times.

The photograph is printed upon paper in an ordinary printing frame upon a negative in the same way as for P. O. P. The depth of printing may be ascertained by opening one-half of the frame turning half of the print back so as to examine it, which if printed deep enough, remove it, or if not deep enough the frame is closed and the exposure to daylight continued until finished.

As soon as the prints are made if on paper they must be well washed for several minutes in half a dozen changes of

clean cold water when they may be fixed at once in a *plain* hypo bath consisting of two ounces of hypo to twenty of water, when after complete fixation, washed well and allowed to remain in this condition for mounting, or as soon as the washing of the prints is completed, they may be placed into the following bleaching solution.

BLEACHING SOLUTION

Water (ordinary)	20	oz. fluid
Bichloride of mercury	1	"
Potassium bromide	¾	"

Dissolve the above and filter the solution.

Now, place the prints into this, turn them over and over until every trace of the image has disappeared, return the bleaching solution to the bottle it was poured from (this solution may be used over and over again). Now, wash the bleached prints well in running water for fifteen minutes, drain them, and place them one at a time into a solution of hypo sulphite of soda, one ounce to twenty of water. The bleached print will now almost instantly turn to a well developed sepia color. Be sure that the print is well fixed, then wash well for half an hour, dry, trim and mount.

SECRET WRITING

By using a quill pen (not a steel one) dipped into this sensitizer a letter may be written, dried, exposed to light so as to secure the writing, then follow the last instructions, bleaching the letter until nothing is visible but a plain sheet of paper, wash it thoroughly, dry, when it will be ready to send to the person intended, who knowing that hypo is the developer, will readily ascertain the contents.

Sateen or silk is prepared as already described, and when dry is placed upon a suitable negative, say a portrait with a black paper oval mask, or vignetted and exposed to light as in the case of paper. Only do not pull the fabric backward to examine the print. Upon opening the printing frame allow the fabric to fall back for examination, and fall back again if returned for further printing, or the fabric may be secured to a sheet of foolscap paper cut to fit the printing frame freely, and the fabric turned over from the outer edges upon the paper and held in position by a touch of soap at each

This print was made on Whiting's Angora Paper in 1913 by the process described.

Illustrating article "A Chemical Sensitizer for Paper, Sateen and Silk," by Alfred J. Jarman.

corner upon the back of the paper. This will enable the print to be turned back for examination and return again in perfect register. The soap will not affect the fabric; of course when washed this mere trace of soap will wash out. It, however, answers a good purpose.

As soon as the prints upon sateen or silk are made, and well washed so as to get rid of the free nitrate of silver, they may or may not be toned in a suitable gold toning solution. The best colors of sateen of good quality or silk are buff or cream, white, yellow or pink. When the latter is employed it is always much more sensitive then the other colors, so prints in less time.

GOLD TONING BATH

Filtered water	30 oz. fluid
Acetate of soda	2 drams
Bicarbonate of soda	20 grains
Chloride of gold	4 grains

This solution must be made for use twenty-four hours before using. Then when the fabric or prints have been well washed, place them one at a time into this solution for about thirty seconds, or even ten seconds, drain quickly, and wash well in clean cold water, wring them out just like wringing a pocket handkerchief, wash well again, then fix the image by placing in a solution of *plain* hypo solution (not an acid hypo solution) one ounce of hypo to twenty of water. Fixation is complete in three to five minutes. Remove the prints and wash well by wringing several times, each time in fresh water, when they may be squeegeed down upon a ferrotype plate to dry, or suspended when they may be ironed flat upon an ordinary ironing board with a flat iron not too hot, in fact only warm. If the flat iron is only slightly warm fine sepia prints will result; if the iron is hot, a blue black will result. In fact, these prints upon fabric may be fixed in hypo only, well washed, and ironed, fine sepia or brown prints always resulting.

By this means book marks and pin cushion tops containing views or portraits may be easily and cheaply made.

EDWARD OSTROM, JR.

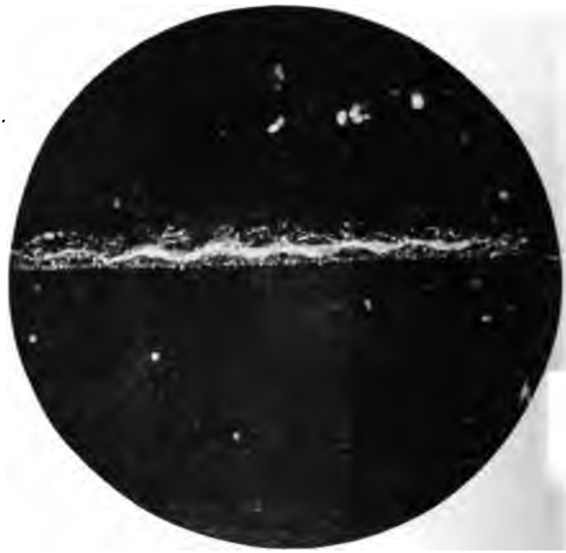


Figure 1.
Artificial leather substitute cross-section showing leather in lower part, and the fibre in middle.
Illustrating article "Photomicrography As Used in Textile Schools," by A. H. Grimshaw.

PHOTOMICROGRAPHY AS USED IN TEXTILE SCHOOLS

By A. H. GRIMSHAW

THIS subject is chosen because of the fact that the microscope is used very often in examining textile fibres, cloth, oils, etc., during the course of study in a Textile School, and in order to preserve the results of the examination for future reference the use of the camera has been of untold value. By combining the microscope and the camera we are able to get pictures of very minute objects. These pictures can be used to explain various points that sometimes are hard to point out with the microscope alone, especially to those who are not familiar with its use.

The readers of the *Annual* are undoubtedly aware of the proper way to use the photomicrographic machine, so only a

PORTICO OF OLD SPANISH CABILDO, NEW ORLEANS.

HAROLD K. FREDERICK.

brief outline of its use will be given here. The student selects his object and carefully mounts it on the slide using whichever mounting medium is best suited for his particular specimen. For small magnification you do not need a cover-glass, but for the large magnification, it is not only useful, but almost always necessary.

Now, the slide is placed on the microscope and focussed properly, the light is started, the camera attached, and the object focussed on the ground-glass at rear of camera.

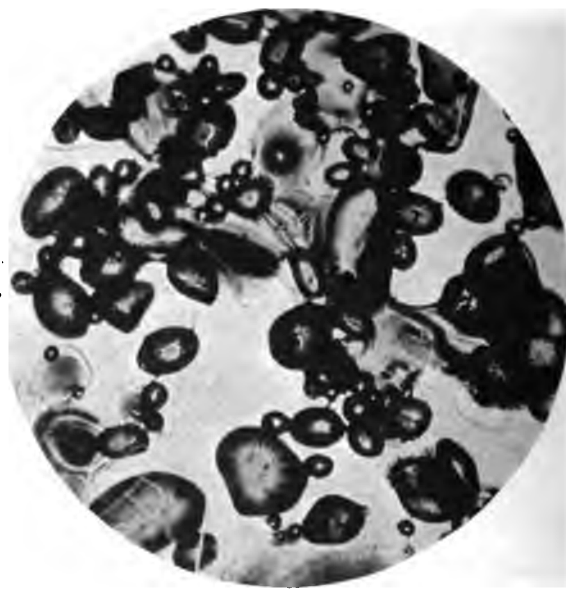


Figure 2.
DOM. POT. STARCH PASTE 1/25 AT 65° C., 230x.

By extending the camera, a larger picture may be obtained. Care must be taken to have the image on the ground-glass very sharp. Focussing sharply and exposing the proper length of time can only be done after much practice. All objects do not require the same exposure because of their different densities and length of camera extension.

Developing the plates and printing the negatives are done in the usual manner, each student using the formulae that he thinks best for the kind of plate used.

Textile fibres are studied and as each fibre has its own

SHADOWS. Geo. B. Akasu.

peculiarities that are visible under the microscope, a set of pictures are made of cotton, wool, linen, ramie, silk, artificial silk, etc. An interesting picture was made last year of a piece of cloth from the wrappings of an Egyptian mummy that was three thousand years old. The cloth was pulled apart, the fibres were photographed, and proved to be linen. Tests of cloth are made in this way to prove that various fibres are used in the manufacture of the sample. This test is necessary oftentimes on cloth that is used in making cheap clothes supposed to be all wool, but which often contain cotton.

The mills that make cloth do not (in almost all cases) finish the cloth; that is to say, they do not bleach and dye it; this is done by the so-called converting plants. If the cloth is spoiled, the converter always claims that the manufacturer was wrong, and vice versa. In a test made this spring of a silk cloth backed with cotton which had small holes in the silk, and not in the cotton after finishing, it was shown by means of pictures that the fault was with the converter.

In the mills, the cloth is examined under the pick glass for defects. By using low power objectives in the microscope pictures can be made which show these defects, and help them to correct their mistakes.

A short time ago a number of samples of artificial leather were examined and photographed to show the manner in which the leather separated from the fabric. It might be mentioned that these leathers were used for automobile upholstery, etc. Figure 1 is a picture of a cross section of artificial leather substitute with the leather in the lower part attached to the fibre in the middle. There were forty samples examined, and by the pictures made it was easy to pick out the sample having the best qualities for this work.

Starches are examined in the school under the microscope, and pictures made of the various starches as each starch granule of rice, corn, wheat, potato, etc., has its own peculiarity. The textile mills buy their starch in car load lots for use in sizing, etc. It has been known that when a high price starch was purchased a lower grade had been mixed with it; also sizing compounds are sold under various names instead of being called starch. By means of the photomicrographic outfit we can secure pictures and readily identify the starches.

When the size is being made the starch is mixed with

water and heated. All starches do not require the same amount of heat, and in order to ascertain the right amount to use, a sample at various temperatures is placed on a slide and photographed. Figure No. 2 shows potato starch which has been treated at 65 degrees Centigrade. You can readily see that some of the granules have broken open and started to form the paste.

In making cottonseed oil, the first part of the process forms an oil that is red in color, due to the red coloring matter in the seed. In Figure No. 3 these small dark spots are receptacles of this red coloring matter. This is a picture of a cross section of a cotton seed magnified 40 times.

The above are a few illustrations showing the value of photomicrography to students at Textile Schools.

Figure 3.

CROSS SECTION COTTON SEED, 40x.

Illustrating article "Photomicrography As Used in Textile Schools," by A. H. Grimshaw.

LES BOEUFS AU BORD DE LA LOIRE. G. TARDY.

PERCENTAGE

By GEORGE D. JOPSON

PERCENTAGE is applicable in many ways. We may refer to a man being 100 per cent, by that expressing our extreme admiration for his perfect manhood. When a boy or girl brings home a report from school that he or she has earned 100 per cent in his or her studies we realize that the highest goal of perfection has been reached by the young student. And so we may go on, where perfection has been achieved, and refer to it as 100 per cent.

Photographers have to deal with chemical problems, so there must be a high chemical standard, namely, 100 per cent.

In our use of chemicals we realize that all solutions used are far below the 100 per cent test—we must use reduced solutions. I have met many photographers who have an erroneous idea, and I must say they have been almost in the majority, that to make a certain percentage solution from a solid chemical all that is necessary is to test it with a little instrument we find quite useful in our laboratory which we call a hydrometer. A bigger error was never made. The following is the rule by which we should work out the required percentage of solid chemicals in water: One ounce of water weighs 455.7 grains. To make a 25 p.c. solution multiply the 455.7 by the 25 p.c. and point off the decimal places, which leaves a remainder of 114, representing the number of grains to the fluid ounce of water to make the solution 25 p.c. One can quite readily perceive that if a hydrometer test of 25 is taken for 25 p.c. the solution will be very weak as to the required chemical—just deduct 25 from 114 and you will realize what the shortage is.

No. 8, or 28 per cent, is the universal strength of Acetic Acid used by the photographer. Many photographers are in the habit of buying the 28 p.c. acid, and paying express or freight on water which could be drawn from the laboratory tap. Certainly, it is much easier to buy the 100, approximately, per cent Glacial Acetic Acid and take 28 ounces of it, adding

TE-ATA. **EUGENE P. HENRY.**

72 ounces of water, thereby obtaining No. 8 or 28 p.c. Acetic Acid. But suppose that you ran out of 28 p.c. Acid and called up all of the drug stores in town and could not find one with 28 p.c. or 100 p.c. in stock but a couple with 36 p.c. on hand?

To be brief—I took the 36 p.c. Acid and reduced it to 28 p.c. as follows: multiplied the required quantity by the required per cent, divided by the higher per cent and the answer was amount of strong acid. Subtracted the answer from the required amount of solution, the answer of which gave the amount of water to be added. Example: To make 50 ounces of a 28 p.c. from a 36 p.c. solution multiply 50 by the 28 p.c. which equals 1,400; divide by the 36 p.c. which leaves, approximately, 39; subtract the 39 from the 50—the amount of the 28 p.c. Acid desired—leaving a remainder of 11 which represents the number of ounces of water to be added to 39 ounces of 36 p.c. Acetic Acid to reduce to 28 p.c.

Simple enough—isn't it?

ROCKY MOUNTAIN NATIONAL AND ESTES PARK, COLO. CLARK BLICKENSDERFER.

A SUMMER SYMPHONY. E. J. SKOUMAL.

A CRITICISM OF THE CRITIC

By G. H. S. HARDING

FROM time to time articles appear in the various magazines condemning so called handwork and other manipulation of the photograph print done by artist photographers.

These writers seem to think anything but a straight record or map of what is before the camera is a crime, until I feel constrained to raise up and question such assertions. Who is to say, and upon what authority, that a photo must be just as a very imperfect mechanical instrument records it?

The most elementary knowledge of art teaches that certain simple but fundamental rules must be observed in order to produce a picture with any excuse for existence.

It is next to impossible to take a detail from nature and have everything just right, the painter artist never even tries to literally copy what is before him, his object being to depict some mood of nature. So it is with a photographer artist. His aim, if he has a truly artistic sense, being to subdue detail and bring out a feeling of light, pattern, gradation or beautiful planes that take one right into the picture for immeasurable distance, or other similar detail of feeling rather than a mere record of the objects before him.

In the effort to do this with the very difficult mechanical means at his command, and photography is a most difficult medium for true artistic expression, many artists have gone too far in their methods of trying to arrive at the desired result, such as the ultra fuzzy work of a short time since, and also the present so called control mediums such as gum and bromoil, which have to be used with rare judgment, though in the hands of a true artist, wonderfully beautiful results have been obtained.

It is hard to understand why any one should object to a practice that has for its only aim the improvement of one's work in an artistic sense.

To read these good people's ravings you would think that

A CORNER—GREEK THEATRE. G. H. S. HARDING.

the finished print was about ten per cent photographic and ninety per cent handwork. There may be a few who go this far, but you do not see such work hung in the leading exhibits.

My own experience is, that the most any real photographic artist ever does in this respect is to tone down obtrusive high lights or lighten up shadows that left alone would ruin an otherwise truly artistic subject; or, if one has the ability, to eliminate some entirely unnecessary and obtrusive object without in any way changing the rest of the picture from its photographic standpoint.

All this leads to the conclusion that there are some art critics who in their modesty and innocence think art can only be expressed in one way—their way—then again there are others who do not think so, which is perhaps the reason why I have written this article.

WHEN HECK WAS A PUP. E. J. WEBER.

A. C. G. ALLISON.

LOW-TIDE, PROVINCETOWN.

Figure 1.
THE YOUNG CANOEIST.
Illustrating article "Insects in Comic Photography," by Dr. Lehman Wendell.

INSECTS IN COMIC PHOTOGRAPHY

By DR. LEHMAN WENDELL

WHENEVER I show my comic insect pictures to friends who have never seen them before I am deluged with questions. "Where do you get them? How do you make them? Are the insects alive? Are the grasshoppers dead? Are the bugs small? Are the jiggers big?" Thus come the questions as from a Gatling gun, and I am never permitted to answer a single question until the ninety-ninth one has been hurled at me. By that time my sense of humor has become fully aroused, and with a look of assumed gravity I begin to explain my methods about as follows:

"You asked first of all where I get them; by which I presume you mean the insects. Strange as the information may seem to you, they are all native sons and daughters of Minnesota. I have tried insects from many other states, but to my profound surprise I find that the insects of Minnesota are

IN·THE·STILLNESS OF THE NIGHT.

the only ones in the United States that have advanced sufficiently intellectually to make fit subjects for the camera.

"I capture the insects when they are babes in their mothers' arms, as you might say, then I take them into my home and from that time until they are ready to pose before the camera they undergo a most rigorous and systematic training. It usually means a year and a half of careful schooling to whip them into line. But the time is well spent, for it affords the trainer the greatest paternal joy to see the wonderful progress of his subjects.

"Most interesting of all is the fact that from the day the insects arrive until the completion of their course of intensive training they are given a special diet, consisting of yeast, dried prunes, and monkey milk in equal proportions, which combination makes them grow like mushrooms. In the course of a year and a half the largest grasshoppers have attained a stature of four and a half feet, with proportional mental development. So marvelous are my trained grasshoppers that Ringling Brothers recently offered me fifteen thousand dollars a year to join their show with my trained insects."

The last statement usually makes my friends wake up to the fact that I am poking fun at them, and then, to make amends, I have to begin all over again and explain in all seriousness how I actually make the pictures. Now, far be it from me to poke fun at the readers of *The Annual,* and so without preliminary fun making I hasten to explain my methods.

Grasshoppers seem to lend themselves most readily to comic photography, and since they are a pest we need have no scruples about killing them, providing we do it painlessly. The most satisfactory method of killing the insects is to drop them into a cyanide bottle, such as all entomologists employ. The bottle is prepared by taking a screw top bottle of sufficient size, putting into it a few lumps of potassium cyanide, and pouring over them a semi-fluid mixture of plaster of paris and water. (Cyanide of potassium is a deadly poison and must be handled with care.) The bottle is then left open for several hours until the plaster thoroughly dries. The purpose of the plaster is to prevent the moisture from the cyanide from reaching the insects.

Having captured and killed the insects, they are brought

THE EVENING PAPER. DR. D. J. RUZICKA.

into the house, where they are staged and photographed. It would be out of the question to make the pictures out of doors, because the slightest current of air would be sufficient to disturb the composition, and a blurred negative would be the result.

The foreground usually consists of some species of moss, and since many varieties exist, sameness in the pictures can readily be avoided. The moss can usually be found in abundance in moist, shady places, and if due precautions are taken, no difficulty will be experienced in removing sufficiently large pieces.

The backgrounds are governed entirely by the effect one desires. In the majority of instances a plain white ground seems to set off the insects to best advantage, and such a background consists of a sheet of white paper placed at a sufficient distance behind the insects to prevent the grain of the paper from showing. If cloud effects are found desirable a photographic enlargement, made from a cloud negative, is substituted for the white sheet of paper, and it is astonishing how realistic such a background will appear. For a dark background a sheet of black paper will be found useful, but if this can not be had, any dark garment will serve the purpose, providing it is hung far enough away to prevent the weave of the cloth from showing.

The insects themselves must be propped in some manner, for their joints are so limber that without proper support they could not be retained in the desired posture. In many instances we need but balance the insects against some object, but if it is found that they need to be held more firmly, a slender wire will be found useful. In propping the insects in this manner care should be taken to conceal the wires, so that no visible means of support will appear in the finished picture.

As for the various accessories, they must be planned very carefully. Never use a hand-made article where some natural object can be made to serve the purpose. For instance, a pea pod canoe is much more effective than one carved out of wood; or a telescope made out of straw looks much more realistic than one made with a jack-knife.

This brief analysis will serve to explain my methods in a general way. In order to be more specific let me describe in

detail one or two of the pictures which accompany this article.

The Young Canoeist. (Figure 1.) This picture was staged in a saucer of water. A strip of moss laid on the edge of the saucer gives the effect of luxuriant underbrush along the shore. The canoe is a large pea pod held open by means of bits of broom straw. The little wooden paddle owes its peculiar shape to distortion due to the refraction of the water. In order to show a reflection in the water the camera had to be placed so low that it was almost on a level with the surface of the water.

Figure 2.

THE ASTRONOMER.

The Astronomer. (Figure 2.) The young katydid, with her long awkward legs, slender antennæ, and little bead-like eyes, seems to be the very insect suited for this kind of a picture, and the fact that Kate is more active by night than by day made her selection quite appropriate. The telescope consists of three pieces of straw slipped one into the other, while the lens barrel is merely one of the joints of the straw. The tripod is made from an umbellate flower, all but three stalks of the umbel, or flower cluster, being removed. To this tripod the telescope was attached with ordinary sealing wax. This is the best substance with which to unite parts

OCTOBER. S. H. SEELIG

because it hardens instantly and leaves the parts rigid. To apply the wax pick up a tiny portion of it with a spatula, melt it over a flame, and allow to drip to place. The spatula can be made from a bit of wire hammered flat at one end. The dark background was obtained by hanging a black garment over the back of a chair. In the negative this appears as clear glass, while the stars are dotted onto this clear portion with a fountain pen. The foreground consists of a rounded tuft of moss to simulate a hilltop.

Illustrating article "Insects in Comic Photography," by Dr. Lehman Wendell.

Any camera will do for this class of work, providing it has a fairly good lens and bellows of sufficient length to allow for close-up work. A ground-glass is, of course, necessary in order that the picture may be focused and composed properly. If the bellows are too short, a cheap slip-over portrait, or copying lens, will be found necessary, either of which will shorten the focus of the original lens. When working very close to an object it is impossible to focus sharply upon all parts of the picture at the same time, and for that reason the diaphragm must be stopped down to 16, or even 32, to increase the depth of focus.

Either plates or films can be used for insect photography. Eastman's Orthochromatic Cut Films give beautiful results. Development may be either by the tray, or tank method.

BRIXHAM HARBOR. W. LAWRENCE REA.

Personally, I prefer the tank method as it is more apt to bring out the details and gradation than the more rapid tray method. If we use a small camera the pictures should be enlarged, 5 x 7 being perhaps the best size. P. M. C. No. 9, either normal or contrast, gives excellent results.

Under no circumstances should the background consist of a pen-and-ink or pencil drawing, for this combined with the product of the camera would be neither a drawing nor a photograph, and from the standpoint of art the result would be a monstrosity. Yet, such pictures are being made and sold.

CHARLES W. DOUTT.

SUMMER LANDSCAPE. GEORGE W. FRENCH.

MOONLIGHT PHOTOGRAPHY

By A. W. DREYER

THE pictorial worker who is seeking for new channels of artistic expression will do well to consider this interesting subject. Imitation moonlight photographs are common enough, and are easily made, but a picture containing the Lunar orb is seldom met with. In looking over the albums of your friends you will find this type of picture conspicuous by its absence. To every hundred photographers there may be one who will take the time and patience to capture the elusive beauty of the full moon with its resulting banner-like reflection upon the water.

The literature upon this subject is very meager, in fact, almost nothing. One writer upon Night Photography boldly asserts that any photograph containing the moon may be considered a fake, and this may have been true in his day However, progress is ever with us, and what was the impossible of yesterday, becomes the matter of fact of today.

Three things are necessary for success, a full moon, a fast lens, and a large body of water, preferably a running stream. A lens working at F6/8 is very good, a faster lens is better. The exposure should not exceed eight seconds otherwise the motion of the moon will become apparent, and instead of a round disc, we will have a segment of an arc.

If there are light, fleecy clouds partly obscuring the Lunar orb, the exposure may be safely prolonged to about twenty seconds without showing motion. In a picture of this kind it is the source of light itself, and the reflection therefrom that we are photographing. It behooves us, therefore, to secure for the foreground and middle ground a lake or stream, the surface of which for best results should be in motion. This will give us a stream of light stretching from one shore to another.

And it is here that a surprise awaits you. The eye may see only a narrow band of light with an occasional ripple on the side. But the sensitive film not only sees, it does more,

it holds and registers each fleeting reflection until in our finished print we have an unlooked-for broad band of light, with each gleaming wave, separate and distinct from its neighbor. With a quiet body of water the result will be disappointing. Then you get only a mirror-like image of the

Illustrating article "Moonlight Photography," by A. W. Dreyer.

moon, a small round spot, and nothing more.

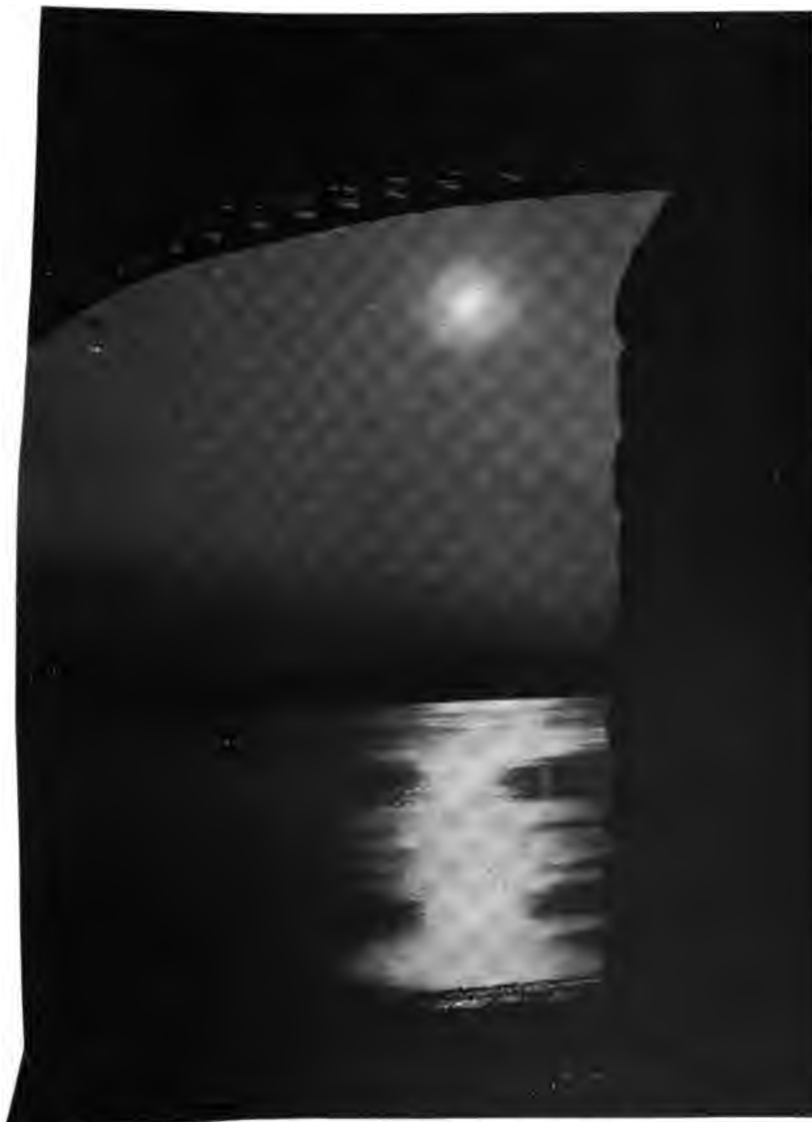
It is advisable to have at one side, in the immediate foreground, the overhanging branches of a tree, or the pier of a bridge, or else the hull of a boat. The dark outline of same will add emphasis and perspective to the picture. If you are located in a large city, it is best to wait ten or fifteen minutes

after the moon is above the horizon, so that it can emerge above the low lying bank of fog and smoke, and assume its full brilliancy. You will soon learn that you will have to confine your efforts to a very few days of full moon, as the light of same diminishes rapidly. For obvious reasons it is advisable to pick out a favorable location beforehand.

With the aid of a compass, you can easily do this, after once having found the point at which it rises, you can then select your future location for the camera, during the day, knowing that the moon will rise where you expect it to. This, of course, holds good only for that particular month. Owing to the moon's declination this point will vary for each succeeding month.

Use dilute developer and prolong the time of same accordingly. Negatives will appear under-exposed, and so they are. However, in order to stop motion we cannot help it, therefore. give plenty of time for development.

E. J. WEBER



Illustrating article "Moonlight Photography," by A. W. Dreyer.

BROMOIL TRANSFERS

By CHARLES H. PARTINGTON

IN two previous issues of the Annual my articles dealt with the making of bromoil prints, the first giving full details of the process, and the second concerned the difficulties presented by certain papers. The articles formerly published cover all phases of the work as far as direct bromoils are concerned.

On several occasions when transfers were mentioned the question was put as to the "why" of making them. There is some foundation to such a query if the person seeking the reason has never viewed a transfer, or better, never produced one. The beauty of a direct bromoil is worth all the time, money and effort expended, and while a transfer is not proper for all subjects, it attains a place of its own when conditions are suitable. The advantage of enriching the result by multiple transfers, and the fact that your finished picture has no gelatine or emulsion in its make-up, simply paper and ink, are two reasons why this process is worth while.

The actual procedure of making transfers can be classed in two separate operations; first, producing the bromoil and second, getting the ink from the original print to the final support. The first operation need not be taken up as it has been covered in former articles, and while any good bromoil will make a good transfer (surface of paper being the right sort as given later) it might be well to list the complete formula I use which has proven to give the most satisfactory results.

DEVELOPER

Water	30 oz.
Sodium sulphite (Anhydrous)	500 grains
Amidol	75 "
Potassium bromide	15 "
Sodium bisulphite	75 "

PORTRAIT. CHESTER IDE.

FIXING BATH

Water	50 oz.
Hyposulphite of soda	5 "
Sodium bisulphite	500 grains

BLEACHING BATH

Water	30 oz.
Potassium bromide	105 grains
Potassium ferricyanide	105 "
Potassium bichromate	180 "
Powdered alum	360 "
Hydrochloric acid C. P.	36 minims

This is the bleacher as published in the old Wellington handbook, and attention is called to the following. Copper sulphate is not in evidence, and the potassium bichromate is far in excess of the amount generally used. Alum is very prominent, and its hardening action is quite a help for transfer work. I have made twenty-seven transfer operations from one print which surely indicates this bleacher puts the gelatine in fine condition.

After bleaching thoroughly, wash well in about six changes of water, as this solution stains the prints very heavily. The stain can be eliminated in a two and a half per cent sulphuric acid bath, but as this tends to soften the gelatine I prefer to omit it. Most of the color not washed out will disappear in the

FIXING BATH

Water	50 oz.
Hyposulphite of soda	5 "
Sodium sulphite (Anhydrous)	2½ "

Fix for five minutes, wash well and dry, after which the print is ready for ink. Brushwork will not be discussed as this work was handled in previous issues.

THE BROMOIL PAPER

The question of what surface of bromide paper to use for transfers has often come up and in answer it may be said that all kinds will work, but proper consideration must be given to the result desired. Taking it for granted that any paper can be inked (even if the contrary is the case) we can divide the surfaces into four main kinds, which are rough, semi-matt, smooth matt and extra rough.

COMING FROM CHURCH, HOLLAND. MYERS R. JONES.

The rough and extra rough in most cases will be found to have a thick coat of gelatine which is not good for heavy pressure, and a light pressure is not sufficient to bring the shadows (sunken places) into contact with the paper to receive the transfer. If the pressure is great enough to produce a full transfer the rough grain of the paper will show, due to a shift of the heavy gelatine coating. This resulting grain is not a detriment for broad subjects or large prints, but for a picture less than 10 x 12" it is better to use a smooth paper.

A smooth matt paper is not always easy to ink, while the semi-matt (or velvet) surface generally takes ink readily. If this paper is used, an additional advantage is to adopt the single weight as it is more flexible and will easily form the proper transfer contact. The relief raised is hardly noticeable, and therefore shadows and high lights are practically on the same plane. When the print is stripped after applying the pressure it will be found to shed almost all of the ink it formerly carried.

In my experience Wellington's Cream Rough Bromoil works very fine for broad effects, and Gevaert's Ortho-Brom No. 3, white semi-matt smooth surpasses anything tried for small prints. This is single weight, inks to the finest detail, and transfers beautifully. A single transfer made with this paper is equal to multiple work produced with other grades, while a double run produces a richness hard to equal.

When working this phase of bromoil the inking must not be heavy, nor the high lights smudged. It is surprising how a slightly veiled high light will transfer and kill the brilliancy of the result. If a double or triple inking is to be worked, most of the ink should be "hopped" off each time before pressure is applied, or the final picture will be "blocked" and the quality lost. The matter of keeping the high lights clean should be accomplished by "hopping" with a dry brush, as the swabbing of the whole print with cotton as mostly advocated, quite often results in disaster, due to smearing.

THE TRANSFER PAPER

Almost any paper can be used as a final support for the picture. I have used Whatman's Hot Pressed (smooth) and Cold Pressed (rough), also Patent Office Bristol Board (smooth, partly glazed) and Strathmore's Two-Ply Water

AUTUMN MORNING LANDSCAPE. Lawrence Baker.

Color papers. The latter is my choice. Some transfers were made on tough Japanese tissue but this, due to being very thin, often buckles and creases under the rolls.

General advice is to the effect that the paper must be dampened before put in contact with the bromoil, and this is no doubt to prevent a tendency of the gelatine to stick when stripped. For single transfers this is all right, but it is somewhat difficult to dampen after one impression has been made. Trouble due to shrinkage will almost certainly be encountered. If the paper is dampened for the first transfer it will swell, and by the time the bromoil is inked again shrinkage will have taken place, and the two impressions will not be in register. Patent Office Bristol Board with its calendered surface will get a good hold on the bromoil print, but if stripped with a steady pull no difficulty should be encountered. By the use of dry paper any number of impressions can be packed up without error in registration.

REGISTRATION

This is very simple and can be described quickly. After pressure has been applied put a pencil mark on each of the four sides of the print crossing right over on the transfer paper. By matching these four points when again placing the two papers in contact a perfect registration will result.

THE SAFE EDGE

While a print can be transferred just as made, then trimmed and mounted, a much neater and artistic result is obtained by making the original enlargement (or contact print) with a white border of about one-half inch or more. After the inking is finished take a piece of wet cotton and clean this safe edge, then trim to a one-quarter inch margin. If the paper is heavy it will press into the transfer paper and form a "plate-sunk" effect. It may also be well to advise that old safety razor blades, and a straight edge are very good for trimming the wet bromoil, and a further advantage is to do the cutting on the emulsion side of an old glass negative.

THE TRANSFER PRESS

This piece of apparatus may be one of several forms. The old style wooden roller mangle or a burnisher (as used to glaze prints years ago) produce fine results, while the ideal

thing is a proof printer's proofpress. A letter press can be used, but it does not always give the best results.

All my work not greater than nine inches wide is done on an old burnisher picked up in a photo supply store (Figure 1). Note that one gear has been removed which makes the bottom roller do all the work of drawing the material through. This bottom roller is polished, and of larger diameter than the top which is finely knurled to form a gripping surface for the old time service. If the gears were left in mesh the top roll would tend to drag the bromoil faster than the transfer paper and cause a smudge.

Figure 1.

An old proof press is shown in Figure 2 which was picked up in a print shop. This is a very heavy old style affair. The roller is six inches in diameter and solid. Being nineteen inches long makes it possible to transfer a print at least eighteen inches wide. Note that the print and transfer paper is laid on the table. The roller is geared with the teeth of the table rack, and in such a manner that the surface speed of both moving parts are identical. The table merely carries the print under the roller which exerts the pressure. There is no tendency to slip as is possible with the two-roller wringer type of press.

MAKING THE TRANSFER

Sheet zinc or steel (about the thickness of average cardboard) is advocated for use in forming the top and bottom of

LIGHTING UP.

This is a single transfer impression from a rough bromoil print. The transfer is on white, ribbed, charcoal drawing paper.

Illustrating article "Bromoil Transfers," by Chas. H. Partington.

the "sandwich," but I have never used either. A heavy, smooth cardboard about one-sixteenth of an inch thick is very satisfactory.

Considering the bromoil is ready first lay out one of the cardboards (or metal sheets). On this lay the transfer paper, then the bromoil (face down.) A blotter is now put next the latter to absorb the moisture that will press out, and on top of this a rubber "printer's blanket," ending up with the second cardboard. The blanket comes in standard cut sizes and can be purchased at rubber stores, or from a firm selling printer's supplies.

With the "sandwich" built up complete it is run through the press once forward and back. Experience will tell the amount of pressure to use.

Figure 2.

After being squeezed remove cardboard, blanket and blotter. If a double transfer is to be made, put the registration marks in place before stripping. Peel off with a steady pull and check the result. While the single impression may not look so well you will be agreeably surprised when the second is applied, and sometimes a third will be an advantage.

Control and varied results are possible with the bromoil transfer, and a few words on these points will not be amiss.

Direct control of the original print as a whole should be handled the same as any bromoil not used for a transfer. High lights that show a slight dead effect after the first pull should not be blocked further, and this is best accomplished by cleaning them with wet cotton before any additional impressions are made. The gain by this operation is great and should be

DOBBIN'S HOME.—(*Bromoil.*) **CHAS. H. PARTINGTON.**

kept in mind at all times. Should certain portions be too light, they can be inked separately and another impression made to strengthen them, while if some parts show heavy enough after one transfer, they need not be inked again.

As mentioned before, the allowance of a one-quarter inch safe edge gives a plate-sunk effect which can be made more attractive by staining. After the print is soaked ready for inking, it is placed in a staining bath until well colored, then rinsed slightly to remove excess of dye and surface dried when it can be inked as usual. When the print is transferred the stain will color the final support resulting in a picture with toned high lights and border. This is especially effective if the transfer paper is several inches larger on all sides than the picture, as no mounting is necessary. I have in mind a certain one of my subjects made in this manner wherein the sunlight effect predominated. The print was inked in sepia and stained yellow, and when transferred to white paper made quite an attractive picture.

If single weight paper is used for the bromoil its thinness will not make a very deep plate-sunk effect, but this can be managed by putting a piece of cardboard of proper size on top of the print to make a deeper impression. This procedure can be improved if desired by the addition of one of two blotters under the transfer paper to form a cushion to sink into. A proper transfer of the stain is difficult to obtain if the bromoil is on a paper that does not give a pronounced relief, as there is not enough gelatine to take up the color. By staining for the second, or even the third impression, the several coats will build up properly and show just as well as a single stain transfer with a high relief paper.

Transferring is a very interesting process and subject to many little tricks capable of giving different results. To me it is very attractive, and no doubt others who have handled it feel the same. If you have not tried it, please do so at the earliest opportunity, and while no prophecy is made that all other print mediums will be discarded, I feel safe in saying you will decide not to stop after the first picture is produced.

IRVING S. LOVEGROVE.

REMARKS ON THE RAYDEX PROCESS

By H. J. CAMPBELL

THE Raydex process of colour photography on paper is no doubt familiar to readers interested in colour work, so it is not proposed to describe in full the various manipulations, but rather to set down a few hints, gained by personal experience and the courtesy of Messrs. Raydex, that are not included in the handbook of the process. Perhaps a very brief outline of the various stages in making a colour print will interest those who are strangers to this method of reproduction. These are as follows:

1. Three negatives of the subject are made through red, green and blue filters respectively.

2. Three bromide prints by contact or enlargement are made from these.

3. Three colour positives are made from the bromides by a method similar to Carbro, in tissues complementary to the taking filters, viz.: blue, red and yellow, and are developed on to transparent celluloid supports.

4. These three colour positives are then superimposed in exact register on a piece of transfer paper and the print is complete.

With regard to the exposure of the three negatives a Watkins meter fitted with a colour-plate dial is recommended, as allowance is there made for the disparity between the necessary exposures in bright and dull light, which do not vary in the same ratio in colour as in monochrome work. Indeed this dial is also of advantage in ordinary photography when using panchromatic plates heavily screened.

It is also very useful in landscape work to practise counting seconds, so as to be able to make the exposures without reference to a watch. This enables the operator to keep his eyes on his subject, and should any movement due to wind occur the shutter can be temporarily closed, and the exposure carried on when all is still again. The moment the shutter is opened should be reckoned as O, not I, and if it be neces-

THROUGH THE TREES. Robert B. Montgomery.

sary to close it when, say, 3 has been counted, the time of re-opening should be the same as that counted on closing. It is almost superfluous to add that the plates should be backed and a lens hood used.

Development, which must, of course, be absolutely uniform in the case of each negative, may be carried out either in a tank or side by side in a dish. In the latter case the developer should be washed away very thoroughly when the time is up, then each in turn is lifted out, the backing washed off, and the plate placed in clean water. When the same treatment has been accorded to all three, then, and not till then, they are transferred to the hypo. Of course, uniformity of treatment is made secure if a repeating back is used in the camera and all three negatives are taken on the same plate.

Great care should be exercised in making the bromides, as on them the success of the result greatly depends. Also since a large number of colour prints may be made from the same set of bromides it is well worth while to get them as near perfection as possible. The source of light, or the aperture of the lens in the enlarging lantern, should be so adjusted that the exposures are not too short.

At least 10 secs. should be given, and the colours of the original should be taken into consideration in estimating the correct exposure. For example, take the case of a blue flower:—it is evident that in this case the yellow printing bromide should show hardly any detail in the high lights and appear under-exposed; if a too full exposure be given the result will obviously be greenish and muddy. The bromides must, therefore, not be over-exposed and must be developed right out to secure correct and bright colours in the print. A number of practically identical bromides from one set of prints may be secured if after re-development the latter are washed, fixed, again washed and kept in clean water until required once more.

If, in hot weather, frilling is experienced when developing the colour positives this may be obviated by floating the colour sheets after stripping from the bromides on top of water instead of immersing them, thus keeping the backs dry. Also see that the blotting paper is dry when squeegeeing to the celluloid supports. Development of the colour positives is conveniently carried out in a horizontal tank—the cellu-

loids being placed in the grooves face downwards, when the backing and the dissolved gelatine fall away automatically. This method is especially useful if it is desired to develop two or three sets simultaneously. Should a number of colour prints of the same subject be required the following way of working will prove expeditious:

Several sets of bromide prints are made, developing them right out in amidol and keeping them moving all the time. They are then trimmed and six or more blues, reds and yellows are placed on three separate pieces of glass. Sheets of colour tissue large enough to cover the six are cut, sensitised and applied to the bromides in the usual way, but it is advisable to interpose between the glass and the bromides a piece of thin celluloid or, failing that, paper. This prevents the bromides slipping out of position and facilitates the removal of the colour sheet and bromide prints together.

Should any difficulty be experienced in registration the simplest plan is to register first one end of the print, keeping it in position by means of a clip. Then bend the celluloid backwards or forwards as required until the other end slips into position, this is also secured by a clip, and the whole kept in this position by a piece of string until dry.

The working details of this process are comprehensively set out in the Raydex handbook, and the company is always willing to give advice to those workers who experience any difficulty in the process.

ARCHITECTURE. G. W. HARTING.

POINT OF VIEW AND THE LENS

By H. A. HUSSEY

A GOOD photographer always tries to make the best presentation of his subject, be it landscape, portrait, architecture, or what not, whether made for pictorial or record purposes. Composition involves many factors with which all are more or less familiar among which these notes deal with only one small but important phase, linear perspective. With the exception of copies of plane surfaces, all subjects involve three dimensions, width, height, and depth, which must be represented on a surface of two dimensions. To be successful the picture must create the illusion of depth and roundness; objects must recede in their accustomed and proper order, be of real substance, and their relative size in the same relation as one is accustomed to see them in nature. This illusion of depth and solidity is dealt with under the term perspective, which may be broadly subdivided into linear and atmospheric.

Linear perspective, as the term indicates, deals with lines, which in turn bound objects, and has, therefore, to do with areas and dimensions. Atmospheric perspective involves less tangible, but equally vital things, lighting, roundness, feeling, atmosphere. In discussions of linear perspective there seems to be some misconception as to the effect that the lens has, or better has not, on the result. As far as perspective is concerned, the lens has little to do with the matter, which at first glance may seem to be contrary to the often repeated statements "a lens of long focal length gives better drawing" and "a wide angle lens exaggerates perspective," which on their face would indicate that there is some inherent property in a lens effecting perspective.

In making a picture it is a good plan to include some object, the size of which is commonly known, to give scale, which will be used perhaps unconsciously as a yard stick with which to measure other and less familiar things. The proper effect of a picture depends more largely than many realize on the knowledge which experience gives us of how things look in

SUNLIT COLUMNS. H. A. HUSSEY.

nature, and a comparison of the picture with things of similar character with which we are familiar.

The effect called linear perspective is given by the relative sizes of the images of objects at different distances from the point of view. As these relative sizes are altered, so is the perspective altered. Here then is the possibility of altering, or controlling perspective, to improve the rendering of the subject, or secure a desired effect.

Each object in the field of view may be considered as the base of an irregular cone of rays, the apex of the cone being at the lens. By the rules of image formation similar cones will be formed by the rays as they emerge from the lens. When the ground-glass is in position of focus the base of each cone emerging will be in the plane of the ground-glass, and the trace of its intersection will be the outline of the corresponding object. The relative size of the images of any two objects is in the same ratio as that of the apex angles of the corresponding entering cones of rays, and is independent of the character or focal length of the lens. The size of the image will vary with the focal length. That is, from the *same point of view* the image of any two objects will be in the same ratio of size irrespective of the focal length, while the actual size is in proportion to the focal length.

To change the perspective (relative size of image) it is necessary to change the point of view. Approaching the subject the apex angles of rays from near objects increase at a faster rate than those from more distant ones, and near objects will therefore, be rendered larger in proportion to those more distant. Applying the yard stick, and by comparison with experience, we feel that distant objects are further away than in the first position. On the other hand, retiring from the subject there will be less difference in the relative size of the apex angles, and in the resulting images, so that the space separation will seem less. If in each of the three positions the same lens and plate size is used there will of course, be a difference in the amount of subject matter included on the negative, and in the size of the image.

In making a picture there is a natural desire to get the image as large as possible, and to cover the plate with hoped for useful material. Herein lies the danger of using a lens at a large angle of view, that is of short focal length as com-

COLD MORNING. H. S. AOYAMA.

pared to the size of the plate. The large image can only be secured by approaching the subject, which is apt to result in the rendering of objects in poor proportion. The extreme case is the horse with a huge head and vanishing hind quarters, or the architectural or interior subject made with an extreme wide angle, which makes the building or room look much out of true proportion.

On the other hand, a lens used at a narrow angle, that is of long focal length as compared to the dimensions of the plate used, will give the same size image from a more distant point of view, and being at a greater distance will usually result in more truly representing the subject, and therefore be more pleasing. There are, of course, times when a wide angle of view has to be used on account of space limitations forcing a near position. On account of the distortion resulting from such position, and inclusion of a larger angle of view than the eye is accustomed to, the results are not happy, and such situations had best not be attempted if pictorial effect is desired.

No definite rule can be given as to the most advantageous length of lens to use for pictorial work, but if only one lens is to be carried it should be at least equal in focal length to the sum of the plate dimensions, or a little longer. There are times when such a ratio will make it impossible to get all of the desired view on the plate on account of limitations imposed by circumstances on the selection of the point of view, but the better average results will compensate for the loss of a few possibilities. When equipment permits it is a decided advantage to have available two or more lenses, or convertible combinations. The writer finds generous trimming needed on many of his 3¼ x 4¼ negatives made with an 8 inch lens, and at times uses an 11½ inch lens on this size plate.

The whole point of the matter is to select the point of view with reference to composition and effect desired, and make the exposure from that point, using the longest focal length lens available which includes the desired view on the plate. Better be content with a small image in good proportion than to strive for a larger image at the expense of good composition.

HOMEWARDS. ALEX KEIGHLEY, F.R.P.S.

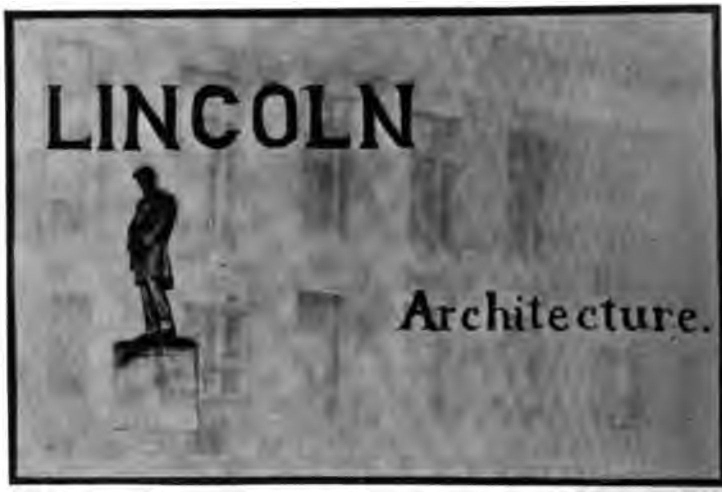


Figure 4.
Illustrating article "What Do You Do With the Prints?" by Dr. Miles J. Breuer.

WHAT DO YOU DO WITH THE PRINTS?

MILES J. BREUER, M.A., M.D., F.A.C.P.

AN amateur who follows the promptings of his hobby for ten or fifteen years, makes during that time, some thousands of pictures. By pictures, I mean reasonably successful prints, which will bear being looked at. I do not mean works of art—just the mass of fairly good prints that he makes during these years.

Where are all of them? Are they past and forgotten, inaccessible as the water of the river that has flowed by? Have you left them behind you among all the other forgotten experiences of the years past?

There is a great deal of benefit and value in the mere exercise of making negatives and prints; there is much training in composition and selection, and the acquisition of the technic of exposure and development, and the development of the faculty of taste in printing and mounting. That, we can never lose, nor can anyone steal it from us. But if you have nothing more concrete to show for your years of photo-

FIRST CHURCH OF CHRIST SCIENTIST, ATLANTA, GA.

R. E. SCAIFE.

graphic work than you have to show for the fish that you caught ten years ago, I think you are losing a large part of the benefit and value of photography. And this is saying nothing of the pleasure and pride of it. It is lots of fun to hike around after good views and to make the negatives and prints. It is just as much, or more pleasure, to look over the old ones you made years ago, and recall the sensations and emotions of the time.

Or, perhaps Mr. Amateur has great heaps of negatives

Figure 1.

somewhere in the corners, piles of glass and film whose contents are as the forgotten mysteries of the tombs of Egypt; and a search among them for some specific one is an endless and perhaps hopeless frowning toward the light. Perhaps he has odd piles of prints in drawers and boxes, with the corners broken and the surfaces worn; and looking for a particular one which he has conceived a sudden desire to see once more, means a shuffling and a turning over; and by the time it is found, the mood has left him.

The following are the reasons why I put my prints in albums, chronologically as I make them:

1. They are kept in order and in good condition, and do not

THE SMOKES OF AUTUMN.
Oil Print Transfer.

DR. GEORGE RICHTER.

get lost. I have something to show for my years of photographic work. In fact, my albums are a continuous history of my photographic activities, and almost a good biography of my life.

2. Albums are much more compact and convenient when it comes to showing prints to your friends. A large number of prints can be shown quickly and with little trouble. Looking over an album of a thousand prints is a pleasure.

3. The albums constitute a record for reference, of the pictures made. Any picture that occurs to me I can find in a few moments, and by means of the number, I can locate its negative in still less time. I think that a dictionary is the only thing that has more information filed in a compact way than a photograph album.

4. It increases the pleasure I get out of photography, to review my old work occasionally. The way a picture will bring back the time and the place at which it was taken is surpassed by nothing. When I compare my work of ten and fifteen years ago with what I put in yesterday, there is a little satisfaction in the progress I have made. And there is nothing that will keep your interest and enthusiasm alive like looking at the old stack of albums.

5. There are many pictures, which do not appear to be of much value or interest at the time they are taken. Often it is quite a difficult question to decide whether to throw the thing away or not. In case of doubt, I usually put them in, and in many many cases already, it has turned out that a few years later I saw much beauty or interest or value in such a picture, and thanked the stars that decided me to keep it. In my early days I took a few with foggy distances, and didn't like them a bit. Now, that is the very thing that we strive for, and some of my earlier fogs I now consider good pictures. Something you read, some picture you see in a magazine, will suddenly open your eyes to the beauties and values in a picture that you had almost decided to burn up. Now you get it out and work it up, and perhaps draw a prize at a salon on it.

Even in an album, several thousand pictures may be very confused, and the friend whom you compel, like the Ancient Mariner, to look at it, may have a dreary and monotonous time getting to the end. My friend John has an album (I am

ANSWERING THE CALL. WALTER P. BRUNING.

giving an extreme example, but it brings out my idea very well) into which he assiduously sticks kodak prints. Then he sits by me and explains them as I turn over the pages:

"This is Molly and her mother and sisters on the front porch; here they are on the lawn; this one is taken by the lawn and there is Molly's brother. Molly took this one and let me get into it; it doesn't look much like me, does it? These were taken when we went down South; there's Molly and Josephine,

Figure 2.

and there's the baby, you can't hardly see her; here's Molly and the children in a cottonfield; that is on a wharf—oh, that's just one of those funny trees that grow down there, but there's nobody on that picture. That's Molly and the children when we went to the Auto Club picnic—"

I think that is enough. Imagine fifty pages of it!

An album can be made interesting to the stranger who casually turns the pages; it is not necessary for the maker to lean over his shoulder and pour the story in his ear. Here are some of the principles for accomplishing that end:

1. Let it tell its own story. Titles and explanations can be

GIRL WITH FAN. **Lou Sweet.**

lettered in with white ink or white pencil. It is surprising how interesting and full of information these selfsame titles will be to yourself who put them there, a few years hence. Of course, if you never "take" anything but Molly and the children, your task will be a little more difficult.

2. Do not paste the pictures on the page three deep. Once a man wrote the New Testament on a postcard. If you insist on doing that with your album, at least do not be offended when your friends yawn and look out of the window when you get them down and force the album upon them.

3. Avoid monotony. Do not make all the pages alike; diversify the arrangement of the prints on the different pages; give us a little variety and freshness as you go on through. After a while you will develop considerable originality, and the interest of those who look through your albums will be very gratifying to you. Figure 1 shows one of my own feeble efforts in that direction.

4. Group the pictures. A single page containing a rose from your favorite bush, a picnic party, a trench on the Eastern front, a portrait study, and a snow scene at night, is not easy to look at. But, if you have a page of flowers, or a page of figure studies, the points of similarity and of contrast, and the unity of the whole, will provide a pleasant few moments for the person looking at it. Grouping prints this way also makes it much easier to find a desired print A common title for the group, as I have it in Figure 1 will always make it more interesting.

5. Especially interesting is it, to group together a considerable number of pictures constituting an episode, say a visit, a trip, or a series of studies. Devote a section of the album to it, and make a title-page or heading-page. This will do very much to relieve the monotony of countless prints in numerous albums. It likewise helps to group and classify the prints for future reference; when a certain print that you are looking for was taken on a trip, or was one of a definite series. it is not much trouble to locate it.

You can have an immense amount of fun, and give your ingenuity plenty of good exercise, devising these heading-pages, as well as good training in photographic methods, in devising means for accomplishing a preconceived end. I am giving and describing a few of my own heading-pages, which may per-

haps give the reader hints and ideas of how to go about fixing up his own albums.

Figure 2 also heads a big group of pictures made on a visit. (The lady who seems to figure so prominently, still continues to figure prominently in my pictures to this day, though now she insists on plenty of pictures of the children.) The method of making it can be readily seen; a selection of some of the pictures from the group, two vignettes and a pen and ink design on the central card, with strips of black paper over the edges where they meet.

Figure 3.

Figure 3 introduces the traveler in my album to about fifty pictures of camp life. It is made in about the same way, though it contains more symbolical sketches in white pencil.

Figure 4 is for a collection of pictures of the more ambitious buildings in our city. The making was not as simple as that of the preceding ones. The background is an enlargement; the soft effect was secured by breathing on the lens of the enlarging lantern; the mist thereby deposited produces not only a diffusion, but a high key in the tones. The statue of Abraham Lincoln was cut out of another print and pasted down; the lettering done in india-ink; the whole photographed

SENTINELS OF THE DESERT.

Copyright 1922
STEPHEN H. WILLARD.

on a process plate, and enlarged on bromide paper to the size of the album page.

Figure 5 is the title page of a separate album in which we keep all the pictures of the children. This is a book for which we would not accept the wealth of the Indies. This page gave a good deal of work, but was worth it. The silhouettes were taken against a bright window, but the resulting print was not satisfactory, nor do I believe that a satisfactory silhouette can be made by that method. The heads were, therefore, outlined in india-ink, and the silver image dissolved away in Farmer's

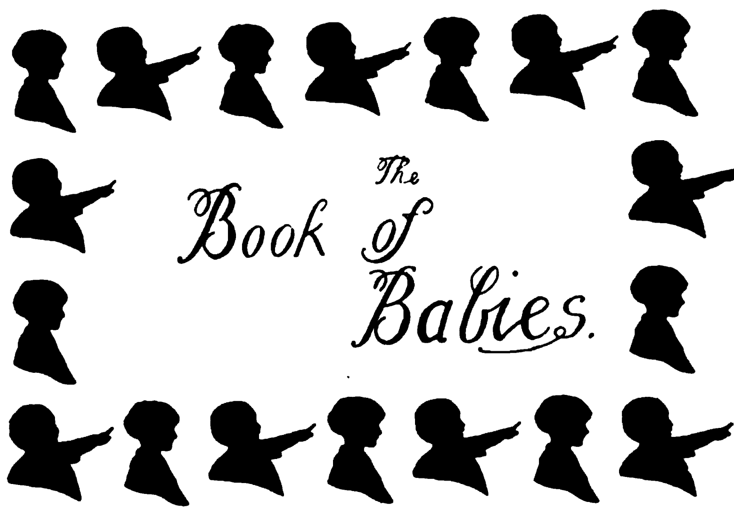


Figure 5

reducer. The head was then filled in a solid black, and photographed on a process plate. A sufficient number of prints was made, and pasted on bristol board, the lettering put in. The large card was then photographed on a process plate, and after etching away little reflections in the heads, and blocking up pinholes with opaque, an enlargement the size of the album page was made.

With albums thus made and preserved, photography is more satisfying; its enjoyment is more complete and the work seems more rounded and finished. Yet, all these albums of "straight prints" in no way interfere with more ambitious work.

WANDERERS FROM HOME. P. DOUGLAS ANDERSON.

TRAVEL AND THE CAMERA

By HERBERT B. TURNER

A PLEASURE trip worth the making is worth recording by a camera, and if it is worth recording it is worth recording well.

It is often said anticipation is nearly as pleasurable as realization. I do not subscribe to this, but believe memory is the next best thing to realization and nothing stimulates memory so well as a picture of a familiar scene. This being so, every effort should be made to record a journey as well pictorially and technically as possible.

The few extra dollars spent in the purchase of a camera equipped with an anastigmat lens of well known reputation, will be an investment never begrudged, paying very large dividends in pleasure.

The writer has spent a fairly large part of his existence wandering in many lands, and has carried hither and there various types of cameras, domestic and foreign, and as of late years photography has become his main study, perhaps he may be entitled to express an opinion on the subject of cameras in relation to travel.

I am convinced that the par excellence type of instrument for making realistic records of a journey is the stereoscope, and by preference the small European type stereoscope so wonderfully developed by our brothers across the water, where they are so popular.

The size known as 4.5 x 10.7 mm. is as compact as a pair of binoculars, most convenient to carry, and inexpensive to maintain. The plates for this size are easy to procure in America, and can be found in nearly every European city. For the best results plates, and not films, should be used. Developed plates will pack, with tissue paper between, eighteen to the original box, and when sealed with gum paper will stand rough usage without breaking. In this way hundreds of negatives can be carried among one's clothing in a trunk with perfect safety and convenience. These little instruments are

WINNIFRED ALLEN.

Copyright by
GEORGE MAILLARD KESSLERE, B.P.

fitted with 1C or 2B Tessars lenses, and can be purchased abroad for less than half of what they cost here.

They give minutely sharp negatives of great brilliancy, and with their two lenses record perspective as the eye sees it; that is, with the sense of depth, separating distinctly the different planes of distance, as the ordinary camera can not do.

The contact prints are made on glass, and when viewed through a stereoscope, or better still a taxiphote, give the beholder the illusion of being actually on the scene. Autochromes are as easily made with such an instrument as monochrome, and to many minds it is the only satisfactory way to employ this delightful color process.

Enlargements up to 8 x 10, or 11 x 14, can be made from the little negatives (and there are two negatives of each particular view on a plate to pick from), especially if a soft lens is employed in enlarging.

The 6 x 13 mm. stereoscope undoubtedly is a better size for making enlargements greater than 8 x 10, and for autochromes it is also preferable, as the grain of the plate is not magnified so much in viewing. The camera is slightly bulkier, heavier, and more costly to manipulate. As far as the quality of the monochrome prints go, I can see no advantage in the 6 x 13 over the 4.5 x 10.7, taking everything into consideration.

Personally, of the many makes of stereoscopes I have used, I prefer the splendid, rigid, fixed focus French camera known as the Richard Verascope.

The next type of instrument best suited for travel is the roll film camera. If one enlarges from his negatives, then the 2¼ x 3¼ is an ideal size, providing it is equipped with an anastigmat, of a make that can be relied upon for minute sharpness and maximum brilliancy. In this size, you have a lens of short enough focus to require little focusing, and you get depth you cannot get in a larger size camera without stepping down. The cost of films is small, the outfit is easy to carry and attracts little attention.

When larger sizes are considered the Special Kodaks such as the 3¼ x 4¼ and the 3¼ x 5½ are admirably suitable for travel. Of course, the Graflex type of camera is par excellence if one does not mind bulk.

Although an enthusiastic user of soft lenses, I do not advise the average worker to carry one on a foreign trip unless he

EQUINOX HOUSE. **Harry A. Neuman.**

duplicate most of his exposures with an anastigmat. It is best to be sure in getting something and diffuse in enlarging than lose by producing a negative not suitable to the subject.

Exposures should be developed on the journey, so that one can correct exposures, and do over, if possible, failures. One should under no circumstances put his plates and films into the hands of local finishers, that is, if one expects even tolerable results. It is so easy to develop by tank or developing box, one's plates or films. For the stereoscopic cameras one can purchase compact and durable developing tanks, while the roll film developing boxes are to be had everywhere.

The stereo plates can be loaded into the magazine, or developing tank, by the use of a muff like changing bag with the greatest ease. I have developed hundreds of autochromes by tray in changing bags while sitting out of doors, and have never had one light struck.

Pyro powders and Burroughs & Welcomes tabloids are found nearly everywhere, also hypo, so the man who has the will to do his own work has the means at hand and his reward will be—good negatives.

If some time is to be spent in a given place, it is wisest to stroll about a day or two making notes of the most promising subjects and the time of their proper lighting before using the camera. In this way a proper selection is made and the conditions for the best rendering known.

A suitable, compact tripod, a thermometer, an exposure meter, a camel's hair brush should be carried in one's luggage as well as a developing box, and if plates are used, a changing bag. And having them at hand, use them.

DEVELOPING VEST POCKET SIZE PLATES

By H. V. SCHIEREN

WHILE on a trip, and wishing to develop a few small plates such as are used in the tiny vest pocket cameras of foreign manufacture, I worked up a makeshift apparatus that worked so well, I have since adopted it as a permanent method. These small negatives ($4\frac{1}{2} \times 6$ cm.) are always troublesome to handle, and as most of them are made with the view to subsequent enlarging, they must be as free as possible from spots and blemishes, in order to get the best results with the least amount of labor.

The small developing tanks put out by various manufacturers are all right, but while loading in the racks it is easy to scratch the emulsion unless extreme care is used, and the edges of the gelatine having a tendency to curl up, bad ragged edges sometimes result. When one is working with such a very small size, *all* of the negative counts and must be preserved.

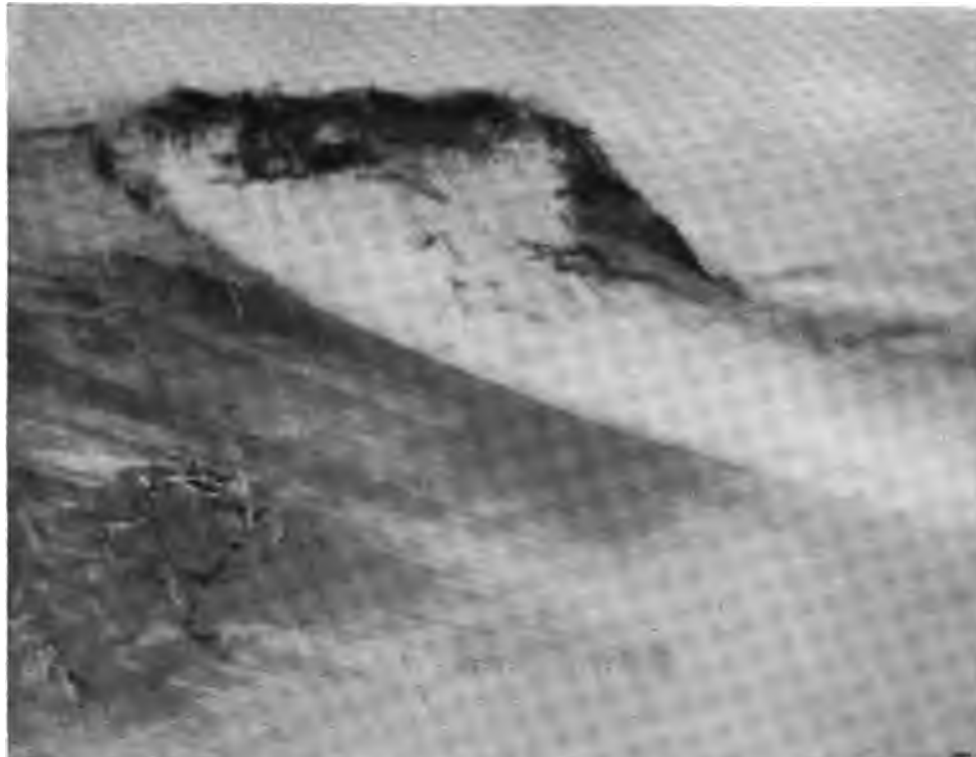
The following method may seem crude, but it has given better results than anything else that the writer has ever tried. For the developing tank use any vessel that is deep enough. The smaller sizes of the tanks made for developing the Eastman Cut Films are splendid, though in a pinch one may even use an ordinary tumbler. Cut as many strips of adhesive tape as you have plates to develop, each strip to be about two inches long, or longer if you think you need it. Stick one end of the tape to the glass side of each negative fastening the other end to some support which will lay over the top of the tank. A glass stirring rod is good, or a piece of heavy wire, or a stick will do. Fasten the plates to the support so that they swing free, that is do not put them too close to the support. You may put one, two, three, or as many plates in a line on the support as the size of your tank will admit. Lower the plates into the developer the same as with a developing rack, pulling them up and down once or twice to remove air bells. Do not worry about the adhesive tape, it will hold and the

S. A. SAND.

plates can easily be examined by the red light, without fear of their coming loose. Washing between developer and fixing is a simple matter. While still on the supporting rod, the negatives are put into the hypo bath, and from there to final washing, followed by drying in the usual way. Leave them fastened to the support until they are thoroughly dry. Remove the adhesive tape from the back of each negative, and if any of the rubberized adhesive still adheres, it can be removed with a bit of cotton, dipped in gasoline or Carbona. Tirro tape which is sold in most drug stores works very well for this purpose. Try this method of developing small plates, and the results will surprise you. The hands and fingers never come in contact with the sensitive emulsion, and sparkling pictures, free from blemishes, are the result.

Use distilled water for developer and for fixing bath, and dry your negatives in a current of warm air if possible, for the more rapid the drying, the more brilliant the negative.

THE CHIPMUNK. ALBERT WILLIAMS, JR.



SAND DUNES. RAYMOND E. HANSON.

SOME AMERICAN SHRINES

By WM. H. BROADWELL

WASHINGTON'S HEADQUARTERS AT WHITE PLAINS, N. Y.

SNUGGLED cosily at the foot of a hill in a lovely little glen is a picturesque little house. Leaving the main road from New York to New England points at a bend one and three quarter miles north of White Plains we descend the hill for about one eighth of a mile when we come to the house occupied by Washington as a headquarters on two occasions. Within sight of the house is the new Bronx River Parkway, another State road, making easy access to it for tourists who care enough to seek out such interesting places.

After the battle of Long Island, the situation of Washington in New York was one of the most trying in which he had been placed. After a second council to deliberate on the further defence of the city, it was thought absolutely necessary to withdraw the army from New York. Brig. Gen. Mercer. who commanded the flying-camp on the Jersey shore, was instructed to move up the river to Fort Lee, the post opposite Fort Washington. At the same time Gen. Clinton moved from Newtown Bay to Kipp's Bay, about three miles above New York.

Washington now drew all his forces together within the lines on Harlem Heights, and fixed his headquarters at Col. Roger Morris's house, at what is now 160th St. and the Harlem River, near Fort Washington. The armies did not long retain their positions on the Island. Howe's plan was to compel Washington to abandon the American camp. With this object in view, he moved his army to Frogs Neck, nine miles from the camp on Harlem Heights.

Washington began moving his army up the North River, extending his left towards White Plains, beyond the British right. As Howe took possession of New Rochelle, Washington occupied the heights between there and the North River. Shortly, both armies marched towards White Plains. The

WASHINGTON'S HEADQUARTERS AT WHITE PLAINS, N. Y.
Illustrating article "Some American Shrines," by Wm. H. Broadwell.

main body of Washington's troops formed a long line of camps, extending from Palentine's Hill, near Kingsbridge, to White Plains, a distance of twelve miles.

After the animated engagement, known as the battle of White Plains, Washington changed his position in the night, and withdrew to a point about five miles from White Plains, to the Heights of North Castle, from which place he soon began his retreat through the Jerseys. He occupied the White Plains building from October 23rd to November 10th, 1776.

After his hard winter at Valley Forge, he moved to Paramus. While here he received word of Count D'Estaing's arrival with a French fleet off the coast of Virginia. To better co-operate with the French admiral he determined to proceed immediately to White Plains, where his army could co-operate with more facility in the execution of any attempts which might be made by the fleet.

His second occupancy was from July 20th to September 22nd, 1778.

THE HEADQUARTERS AT ROCKY HILL, N. J.

Rocky Hill, New Jersey, a few miles from Princeton, is famous as the place where General Washington wrote his farewell address to the Continental Army, at the close of the struggle between the thirteen colonies and England.

The mansion of Judge Berrien, on Rocky Hill, is a quaint old house, cared for by loving and reverent hands and kept as a shrine for those who love to seek out and visit the places which have played an active part in our country's history.

It was long after the great events of the war. Battles had been won, some lost. The red coats driven hither and yon, and two years before, at Yorktown, Lord Cornwallis had surrendered to the Continental army.

All the beautiful country was decked in gold and scarlet; the fields and meadows ablaze with the autumn flowers, when on October 18th, 1783, two years less one day after Cornwallis laid down his arms, that Congress issued a proclamation discharging the soldiers from further service.

Washington was occupying the mansion of Judge Berrien as his headquarters, Congress being in session at Princeton. The Commander-in-Chief held many conferences with the members of Congress and it was essential that he be near at

WASHINGTON'S HEADQUARTERS AT ROCKY HILL, N. J.

Illustrating article "Some American Shrines," by Wm. H. Broadwell

hand. So the time came when he must say goodbye to the men who had fought so faithfully under him.

These were the men who had gone hungry and cold for the cause at Valley Forge, who had been blistered with the July sun on Monmouth field and frozen with the ice on the Delaware; who had been stricken with the fever at Morristown; who had retreated footsore and heart sick across Jersey: who had dashed recklessly on sleeping Paulus Hook; who had laughed at flying bullets at Connecticut Farms, to whom he was to say farewell.

The farewell address of Washington is one which will stand for centuries as a model for all men. You can read it today, and in it find counsel which cannot but make better and truer citizens of that country which Washington and his men gave you.

I can do no better than quote you a little from this address: "Let it be known and remembered," wrote Washington, "that the reputation of the Federal armies is established beyond the reach of malevolence, and let the consciousness of their achievements and fame still incite the men who composed them to honorable actions, under the persuasion that the private virtues of economy, prudence and industry will not be less amiable in civil life than the more splendid qualities of valor, perseverance and enterprise when in the field."

"Economy, prudence and industry"—if all our citizens would cultivate those qualities what a world of difference it would make today—as it did in the early days of our country.

But, to get back to our subject, the old house which sheltered Washington so hospitably. It stood for more than a century on Rocky Hill, until, in 1897, it was moved from its foundations to a spot one-half mile distant, kept and preserved by the D. A. R.

Of the many tourists who traverse the Lincoln Highway from New York to Trenton and Philadelphia, probably few know that by turning off at Mercer's bridge, a few miles north of Princeton and about one mile from the Highway they can see this wonderfully picturesque old house.

We can indeed be grateful for all these famous old places that have been preserved all these years—but especially grateful for this fine old place at Rocky Hill which saw the writing of Washington's farewell address.

IN THE CATHEDRAL OF
ST. JOHN THE DIVINE

MRS. ANTOINETTE B. HERVEY.

Illustrating article "Notes on Mountain Photography," by Dr. Wm. E. Ziegenfuss.

NOTES ON MOUNTAIN PHOTOGRAPHY

By DR. WM. E. ZIEGENFUSS

BY mountain photography I mean all those scenes and compositions that owe their principal settings to the mountains, and not just pictures taken in the mountains which can not be told from those taken on the plains.

Unquestionably the most interesting scenery is found in the volcanic formations of the mountains of the far western ranges, especially that of the Rockies, Sierras, and the Cascade ranges, abounding in wonderful canyons and waterfalls, giant peaks eternally snow-covered, as well as in great natural parks fairly covered with nature's supreme creations in many-colored wild flowers.

For the lover of the great out-of-doors nothing is so gainful, physically and artistically, as a vacation spent in the mountains. Looking upon all kinds of interesting and pleasing scenes begets the desire to preserve some of them as mementos of the season, and as an aid to visualize his experiences to his friends.

Of all the plates and films exposed in the mountains only a small percentage of them turn out satisfactorily. The reasons for this low average are many, but the most deceptive of them all is the peculiar atmospheric condition found in the higher altitudes, and as success depends upon proper exposure

SOLITUDE.

Illustrating article "Notes on Mountain Photography," by Dr. Wm. E. Ziegenfuss.

in every kind of photography, it is here that most failures originate to disappoint the novice, and often the expert as well.

Every one who exposes a plate or film expects, or hopes, that a good negative will result from it, and when the failure is seen some one is ready to blame the manufacturer or the finisher—'tis the easiest way to shift the responsibility. Those of maturer experience are not given to blame the makers of films and plates until the real cause of the failure has been discovered, which in ninety per cent is in the operant. The gray-blue haze is the chief enemy of successful picture making in the mountains. While only faintly visible to the naked eye, it is of such an actinic nature that no unaided emulsion can "see" through it. The consequence is that distance flattens out of all proportion to what is seen—and disappointment results. This condition of haze can not be overcome by exposure alone, though a liberal exposure helps it. But it can be overcome by the use of orthochromatic plates and films in conjunction with any of the standard ray filters.

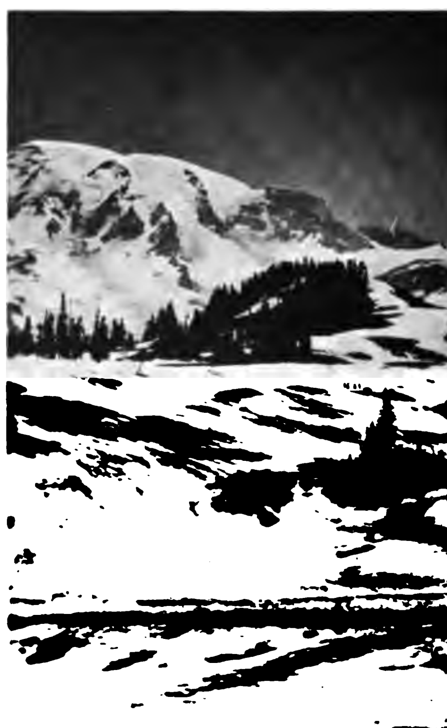
The brighter the day, the stronger the gray-blue haze, the deeper the filter, is a safe rule. It necessarily requires more time under such circumstances, and snap-shots are not always advisable, unless in the case of brightly lit glaciers and snow-capped peaks, when 1/25th of a second gives good results. The picture of Mount Rainier-Tacoma (Figure 1) was taken on speed film, at 1/25 second, at F/22, but the light was very bright in the month of July. The picture of Lake Kachess (Figure 2) in the Cascade range received one second exposure for the same film and diaphragm—but there was no sunshine and a light rain was falling at the time. Hence "Solitude" seemed a very appropriate name for it.

Another factor must be taken into the reckoning, though this is very much easier overcome than the ever-present haze. This is especially present in the higher altitudes—the Alpine atmosphere one finds above five thousand feet elevation. The higher the elevation the less haze and moisture is found in the air, and less exposure must be given on this account, other conditions being the same as at lower levels. The exposures need not be much shorter—about twenty-five per cent less will make allowance for the difference in light.

What I have said above has reference to landscapes of more

SPRING SONG. TAIZO KATO.

or less distance. But the mountain fastnesses abound in numerous interesting objects upon which the photographer can exercise his skill and artistic tastes. Strange geological formations crop out in many places; giant trees raise their tops into the sky; rare wild flowers of many colors await lovers of the beautiful; waterfalls of rare beauty ripple and roar over precipices; sometimes living things, birds and beasts, are found and one skilled in shooting with the camera may obtain worth while pictures of these; then there are creeping and crawling and flying things—every one of which can be made the subject of interesting pictures. Perhaps I am unduly enthusiastic in the advocacy of out-door work; I urged this policy in an article in this publication two years ago, and have no reason to change my opinion of the value of the great out-of-doors. Try the mountains next vacation time.



MT. TACOMA, 14,408 FT. IN HEIGHT. TAKEN AT AN ELEVATION OF 5000 FT.

Illustrating article "Notes on Mountain Photography," by Dr. Wm. E. Ziegenfuss.

BELLE JOHNSON.

American Annual Formulary

In the following section we have gathered together a typical collection of Formulæ and Tables, which will assist the photographer in his every-day work. It will be noticed that makers' formulæ are omitted. These can best be obtained by direct application to the makers. The appended formulæ are selected from the working methods of practical photographers.—Editor.

TANK DEVELOPERS FOR NEGATIVES

Metol-Hydro (Frew).—Water, 12 ounces; metol, 7½ grains; sulphite soda (anhydrous), 274 grains; hydroquinone, 30 grains; carbonate soda (anhydrous), 150 grains; bromide potassium, 2 grains. For use to each ounce of above add 4 ounces of water; temperature, 65 degrees; time, 12 minutes.

Monomet-Hydro-Pyro (John Boyd).—Monomet, 4 grains; hydroquinone, 4 grains; pyro, 4 grains; metabisulphite potassium, 4 grains; carbonate of soda, desiccated, 40 grains; sulphite of soda (anhydrous), 60 grains; bromide of potassium, 1 grain; water, 4 ounces. For tank development use 28 ounces of water. Development, 20 minutes at 65 degrees.

Pyro (George D. Jopson).—No. 1. Water, 16 ounces; metabisulphite of potash, 70 grains; pyro, 1 ounce; bromide potassium, 8 grains. Mix in order given. No. 2. Sulphite soda, 60 degrees test. No. 3. Carbonate soda, 40 degrees test. To use, mix 2½ ounces of No. 1, 2 and 3 in rotation, add 57 ounces of water. Develop 20 minutes at 65 degrees.

Rodinal or Activol.—Water, 60 ounces; rodinal or activol, 1 ounce; temperature, 65 degrees; time, 25 minutes.

TRAY DEVELOPERS FOR PLATES AND PAPERS

Amidol. (W. M. Keck).—Amidol, 20 grains; sodium bisulphite (dry), 40 grains; sodium sulphite (dry), 60 grains; potassium bromide (powdered), 1 to 3 grains; water, 4 ounces. For all kinds of developing paper. Expose so that the development will be complete in twenty to thirty seconds. The tone is a blue black.

Amidol Universal Developer. (W. A. Alcock).—Water, 20 ounces; sulphite of soda (dry), ¾ ounce; amidol, 50 grains; potassium bromide, 10 grains; citric acid, 20 to 40 grains. Splendid developer for papers intended for bromoil. Expose so that the image first shows in thirty seconds and develop for four minutes. Gives good tones in hot or cold hypo alum, and nice soft negatives. Splendid in hot weather as it minimizes danger of frilling owing to lack of carbonate.

Adurol. (Hauff). (Anson Herrick).—25 grains; sodium sulphite (anhydrous), 190 grains; hydrochinon, 40 grains; sodium carbonate (anhydrous), 200 grains; potassium bromide (saturated solution); 15 minims; water, 20 ounces.

Diamidophenol. For Paper (Edwin Loker).—Water, 20 ounces; sodium sulphite (anhydrous), 1½ ounces; sodium bisulphite, 10 drams; bromide potassium, 10 grains. To use, take 2 ounces and add 6 grains diamidophenol.

Ferrous Oxalate. For Papers (M. G. Lovelace).—No. 1. Hot water, 1000 CC. Dissolve ferrous sulphate, 250 grams; add slowly sulphuric acid, 3 CC. No. 2. Potassium oxalate (neutral), 250 grams; potassium bromide, 1 gram; hot water to make 1000 CC. Add 1 part of No. 1 to 4 parts of No. 2. After development wash in acetic acid stop bath.

Hydroquinone. (Max Gartner).—Solution No. 1. Water, distilled, 20 ounces; hydroquinone, 160 grains; sodium sulphite (anhydrous), 2 ounces; citric acid, 60 grains; potassium bromide, 40 grains. Solution No. 2, water, distilled, 20 ounces; caustic soda (sticks), 160 grains. For use take No. 1 one part, No. 2 one part, and water two parts.

Hydrochinon.—For over-exposure plates to obtain contrasty negatives (B. H. Allbee).—No. 1, water, 8 ounces; sulphite of soda (anhydrous), ½ ounce; hydrochinon, 80 grains. No. 2, water, 8 ounces; carbonate of soda (dry), 1 ounce; potassium bromide, 40 grains. Take equal parts of No. 1 and No. 2. Temperature, 70 degrees.

Metol (H. W. Hales).—Metol, 60 grains; warm water, 16 ounces; sulphite of soda (anhydrous), ½ ounce; carbonate of soda (dry), ½ ounce. Dissolve metol in warm water, then add the sulphite and carbonate in order named. Cool. Can be used repeatedly. For developing papers add a few drops of 10 per cent solution of bromide of potassium.

Metol-Hydroquinone for Orthochromatic Plates.—Water, 20 ounces; metol, 14 grains; potassium metabisulphite, 18 grains; hydroquinone, 56 grains; sulphide of soda (anhydrous), 1 ounce; carbonate of soda (dry), 1¾ ounces. Use 1 drop of a 10 per cent potassium bromide solution to each ounce only if necessary.

Metol-Hydrochinon. (Lloyd L. Snodgrass).—Water, 1.0 liter or 30 ounces; metol, 1.6 grams, or 22½ grains; sodium sulphite, 240 grams or ¾ ounce; hydrochinon, 6.6 grams or 90 grains; sodium carbonate, 24.0 grams or ¾ ounce. For use dilute with equal quantities of water. Add potassium bromide as needed.

Metol-Hydroquinone. For Paper (M. Gartner).—Water, distilled, 3 ounces; metol, 15 grains; sulphite of soda (anhydrous), 1 ounce; hydroquinone, 60 grains; sodium carbonate (dry), 6 drams (for contrast use 1 ounce); bromide of potassium, 5 grains. Dilute this stock solution with an equal amount of water.

Developer for Commercial Work. (Max Gartner).—Water, distilled, 100 ounces; Ortol, ½ ounce; hydroquinone, 2 ounces; sulphite of soda; anhydrous, 8 ounces; carbonate of soda, anhydrous, 12 ounces; bromide of potassium, ¼ ounce. For plates use full strength.

Para-Amidophenol. (M. G. Lovelace).—Dissolve 150 grains sulphite soda (anhydrous) in 800 CC. hot water; add 20 grains para-amidophenol; dissolve 8 grains lithium hydrate in 100 CC. water, and add until precipitate formed is dissolved; then add water to make 1000 CC.

Pyro. For Prints (M. G. Lovelace).—No. 1 Pyro, 12 grains; sulphite soda (anhydrous), 80 grams; potassium ferrocyanide, 2 grams; water, 500 CC. No. 2 Sodium hydrate, 4 grams; water, 500 CC. To use, one part each with water 2 parts. Add 3 drops saturated solution bromide of potassium to every 400 CC. of developer.

Pyro. For Night Subjects (Robert Dykes).—Stock solution—Pyro, 1 ounce; potassium bromide, 60 grains; potassium metabisulphite, 50 grains; distilled water to make 12 ounces. No. 1. Take stock solution 3 ounces, add 2 ounces boiled water. No. 2. Sulphite soda (anhydrous), 1 ounce; carbonate soda (dry), 1 ounce; water (boiled) to make 20 ounces. For use, 4 drams No. 1 to 5 drams No. 2 in 16 ounces of water.

Pyro. For Overtimed Plates (J. D. Elliott).—Sulphite soda, 40 degrees solution, 4 ounces; water, 4 ounces; pyro, 10 grains. Immerse

plates in this solution for 20 minutes in the dark; then add to above solution ½ dram carbonate soda, 20 degrees solution. When image appears add one more dram of the carbonate soda solution.

Pyro. (W. M. Keck).—Pyro, 20 grains; sodium carbonate (dry), 40 grains; sodium sulphite (dry), 60 grains; water, 16 ounces. For either tray or tank development. Time, 6 minutes.

Pyro Tray Film Developer. (J. E. Carson).—No. 1 solution, boiled water or rain water, 8 ounces or 240 C.C.s; potassium metabisulphite, 60 grains or 3.55 grams; pyro, 120 grains or 7.10 grams. No. 2 stock solution; boiled or rain water, 8 ounces or 240 C.C.s; sulphite soda anhydrous, 328 grains or 21½ grams; carbonate soda, 219 grains, or 14¼ grams. For developing use half ounce or 15 cubic centimeters of each solution, and 4 ounces or 120 C.C.s water. Develop for five minutes at 65 degrees.

Pyro-Metol. For plates (H. M. Long).—A. Water, 22½ ounces; metabisulphite, 2 drams; metol, 60 grains; pyro, 1 ounce. B. Water, 16 ounces; sulphite soda (anhydrous), 2 ounces. C. Water, 16 ounces: carbonate soda (dry), 1 ounce. Normally used 1 ounce of each stock to 16 of water.

DEVELOPERS FOR LANTERN SLIDES

Hydroquinone (B. H. Allbee).—No. 1. Hydroquinone, 150 grains; metabisulphite potash, 10 grains; bromide potassium, 50 grains; water, 20 ounces. No. 2. Sulphite of soda (anhydrous), 1 ounce; caustic soda, 100 grains; water, 20 ounces. Take equal parts of No. 1 and No. 2.

Hydroquinone. One Solution for Warm Tones (A. H. Farrow). Hydroquinone, 1 dram; sulphite of soda (anhydrous), 2 drams; carbonate of soda (dry), 4 drams; bromide of potassium, 20 grains; water, 12 ounces.

Hydroquinone. For Colder Tones (B. H. Allbee).—No. 1. Hydroquinone, 60 grains; sulphite of soda (anhydrous), 1 ounce; citric acid, 10 grains; bromide potassium, 10 grains; water, 10 ounces. No. 2. Carbonate of soda (dry), 1 ounce; water, 10 ounces. Use equal parts.

FIXING BATHS AND HARDENERS

Fixing and Hardening Bath. For Plates, Films and Papers. (W. A. Alcock).—In hot weather, hypo, 1 pound; epsom salts, 1 pound; water, 100 ounces. In cold weather, hypo, 1 pound; epsom salts, ½ pound; water, 100 ounces.

Acid Fixing Bath (W. Wynne Bolton).—Water, 80 ounces; hypo crystals, 24 ounces; sulphite of soda crystals, 8 ounces; alum (chrome), 4 ounces; acetic acid, 6 ounces. Dissolve chemicals in order named. Will keep from three to six months in a cool place to use over and over.

Acid Fixing Bath (Carbutt).—Sulphuric acid, 1 dram; sodium hyposulphite, 16 ounces; sulphite of soda (anhydrous), 2 ounces; chrome alum, 1 ounce; warm water, 64 ounces. To prepare the bath, dissolve the hypo in 48 ounces of water, the sulphite of soda in 6 ounces; mix the sulphuric acid with 2 ounces of the water and pour slowly into the sulphite solution and then add to the hypo solution. Dissolve the chrome alum in 8 ounces of water; add to the bulk of the solution and the bath is ready for use.

Fixing Bath for Lantern Slides (B. H. Allbee).—Sulphuric acid, 1 dram; hypo, 16 ounces; sulphite of soda (anhydrous), 1 ounce; chrome alum, 1 ounce; water, 64 ounces.

Plain Fixing Bath.—Dissolve 1 pound of sodium hyposulphite in 2 quarts of water, or 4 ounces of the hypo in a pint of water, according to the bulk of the solution required.

Hardener for Fixing Bath (Beach).—Water, 40 ounces; sulphite of soda (anhydrous), 3 ounces; powdered alum, 16 ounces; acetic acid, 40 ounces. Add in the order given and shake well until dissolved. Of the above add 16 ounces to each gallon of hyposulphite of soda solution, testing 70 to 80 degrees.

Hardening Negatives.—Immerse them for a few minutes in formalin, 1 ounce; water, 30 ounces.

Short Stop removes developer stains; renders an acid fixing bath unnecessary when making D. O. P. or bromide prints, and destroys stains on both prints and fingers. (J. E. Carson).—Potassium metabisulphite, 1 ounce or 30 C.C.s; water, 32 ounces, or 960 C.C.s. When thoroughly dissolved add 10 drops C. P. sulphuric acid. This bath should have a light sulphur dioxide odor after standing awhile. If not, add acid drop by drop until odor appears.

INTENSIFICATION

Intensifier, One Solution (F. M. Steadman).—No. 1. Bichloride of mercury, ½ ounce; water, 10 ounces. No. 2. Iodide of potassium, 5 drams; water, 1½ ounces. Add to No. 1. No. 3. Hyposulphite of soda, 1 ounce; water, 2½ ounces. Add to the previous mixture. This clears the solution when it is ready for use for local intensification. For tray intensification add more water to slow its action.

Intensifying with Red Ink (E. M. Cohen).—Soak the negative well. Put teaspoon of red ink into tray of water and rock until mixed. Immerse negatives face up till well and evenly colored, then without washing put in drying frame. If left in solution too long will be over dense, in which case several trays of clear water will eliminate some of the color.

The intensification is permanent without the danger of negative going bad, as is the case when mercury is used.

Intensifier—Mercuric Chloride Process.—No. 1. Mercuric chloride, 200 grains; bromide of potassium, 120 grains; water, 6½ ounces. No. 2. Sulphite of soda (anhydrous), 1 ounce; water, 4 ounces. The well-washed negative, free from hypo, must be thoroughly bleached in No. 1; well washed; and then blackened in No. 2. After blackening, it is well washed again.

Intensifier. (Monckhoven's).—A. Potassium bromide, ¾ ounce or 25 grams; bichloride of mercury, ¾ ounce or 25 grams; water, to 32 ounces or 1 liter. B. Potassium or sodium cyanide, ½ ounce or 25 grams; silver nitrate, ¾ ounce or 25 grams; water, to 32 ounces or 1 liter. In making up the intensifier the B solution requires care and must be made as follows: The cyanide and the silver are dissolved in separate halves of water, and the silver solution is then added to the cyanide solution until the precipitate formed no longer dissolves; that is to say, there must be a little precipitate left. The negative is placed in A until it is thoroughly bleached. It is washed for at least two minutes and placed in solution B to blacken.

REDUCTION

Reducer, Single Solution (F. M. Steadman).—Red prussiate of potash, size of pea; hyposulphite of soda, six times that volume; water, 6 ounces (for local reduction, 1½ ounces). When reduced wash thoroughly.

Reducer—Ammonium Persulphate.—Ammonium persulphate, 15 grains; water, 1 ounce. The solution should be made just before use. The negative must be perfectly free from hypo, or it will be stained by the persulphate. When the desired reduction has been reached. transfer the negative without washing to a 10 per cent solution of anhydrous sodium sulphite. Wash finally for 15 or 20 minutes.

Reducer—Farmer's.—Dissolve 1 ounce of potassium ferricyanide in 9 ounces of water and make up to 10 ounces, forming a 10 per cent solution. Label this poison. Thoroughly wet the negative to be reduced. Take enough fresh plain hypo, fixing bath for the purpose, and add to it enough of the ferricyanide solution to make it a light straw color. The negative to be reduced is immersed in this solution, when it will be seen to lose density. Rock the tray to insure evenness of action. This reducer can also be used for local treatment.

PRINTING PROCESSES

Blue Prints

Blue Printing Sensitizing Formulæ (Brown).—A. Dissolve 110 grains ferric ammonium citrate (green) in 1 ounce of water. B. Dissolve 40 grains of potassium ferricyanide in 1 ounce of water. These two solutions are made up separately. They are then mixed together and kept in a stoneware bottle, but the single solution should always be filtered before use. The mixture will retain its good qualities for months if kept from the light.

(Millen).—Potassium ferricyanide, 1 ounce; ammonio-citrate of iron 1½ ounces; distilled water, 10 ounces. Mix thoroughly and filter. The solution should have a deep wine color and dry on the paper a lemon-yellow. If the solution is green and has a precipitate, the ammonio-citrate is old and spoiled. The mixture should be kept from the light.

Bromide Paper

Bromide Paper Developers: Hydroquinone-metol. No. 1. Water, 10 ounces; hydroquinone, 52 grains; potassium metabisulphite, 18 grains; sulphite of soda (anhydrous), 5 drams; carbonate of soda, 1¼ ounces. No. 2. Water, 10 ounces; metol, 30 grains; carbonate of soda, 5 drams; sulphite of soda (anhydrous), 5 drams. One or two drops of a potassium bromide 10 per cent solution added to 1 ounce of the mixed developer will increase contrast and keep the whites pure. Equal parts of 1 and 2 give excellent prints from a normal negative; one part of 1 and two of 2 give gray prints with maximum half-tone and gradation; two parts of 1 and one of 2 give vigorous prints from soft delicate negatives.

Amidol for rich blacks (freshly prepared). Distilled (or boiled) water, 4 ounces; sulphite of soda (anhydrous) 45 grains; amidol, 10 to 15 grains. Add a drop of 10 per cent bromide solution to each ounce of developer.

Sepia Tones: Hypo Alum.—Hyposulphite of soda, 5 ounces; ground alum, 1 ounce; boiling water, 70 ounces. Dissolve the hypo in the water and then add the alum slowly. A milk-white solution results which should be decanted when clear. It is not used until cold (about 60 degrees Fahr.).

Sepia Tones: Sulphide of Sodium.—The fixed and washed print is treated with one of the following solutions: (1) Potassium ferricyanide, 10 grains; potassium bromide, 10 grains; water, 1 ounce; or (2) potassium ferricyanide, 20 grains; sodium chloride (common salt), 30 grains; water, 1 ounce. The image will be bleached by either of these solutions in a few minutes, the whitish appearance of the deposit being caused by its change into a salt of silver. After 5 minutes in running water apply the sulphuretting solution: Dissolve 3 ounces of sodium monosulphide in 15 ounces of water; boil the solution for about 10 minutes, filter off the black precipitate formed, and when cooled make up to 25 ounces with water. To tone take of the sulphide solution 1 ounce and add water 12 to 20 ounces.

Red Tones: Copper.—Dissolve 100 grains of ammonium carbonate

in 2 ounces of water, and in this solution dissolve 10 grains of sulphate of copper. Then add 20 grains of potassium ferricyanide. A clear, dark green solution results, which gives a red-chalk tone in about 3 minutes. Tone until the deepest shadow is converted, and then wash the print for 10 minutes.

Green Tones: Vanadium.—Bleach print in the following: Potassium ferricyanide, 10 grains; ammonium carbonate, 100 grains; water, 1 ounce. Wash well and apply: Ferric chloride, 2 grains; vanadium chloride, 2 grains; ammonium chloride, 4 grains; hydrochloric acid, 5 minims; water, 1 ounce.

Blue Tones: Iron—Bleach print in: Potassium ferricyanide, 10 grains; ammonium carbonate, 100 grains; water, 1 ounce; then tone in ferric chloride, 5 grains; hydrochloric acid, 5 minims; water, 1 ounce.

To prevent blistering on bromide paper (P. L. Anderson).—Immerse after fixing and before washing from 10 to 15 minutes in water, 10 ounces; formaldehyde, 1 ounce. A 10 per cent solution of chrome alum will do equally well.

To make bromide paper translucent (P. L. Anderson).—Lay the paper negative face down on a blotter and paint thinly with the following mixture. Give three coats. Turpentine, 3 ounces; powdered resin, 1 ounce; gum elemi, 1 ounce; paraffine wax, ½ ounce. Heat with stirring until it begins to boil. Allow to cool slightly and add turpentine, 3 ounces.

Carbon Tissue

Carbon Tissue, Sensitizer for (Bennett).—Potassium bichromate, 4 drams; citric acid, 1 dram; strong ammonia water, about 3 drams; water, 25 ounces; dissolve the bichromate and citric acid in hot water, and add sufficient ammonia to change the orange color of the solution to lemon-yellow. Sensitize for 90 seconds; reducing the water softens the gradation in the print; increasing it to 30 ounces gives more vigor.

Carbon Lantern Slides.—Prepare the glass by coating with the following preparation: 180 grains of Nelson's Gelatine No. 1, in 20 ounces water. Add 10 grains bichromate of potash. Dry and allow the plate to be exposed to light for a couple of days to make the coating thoroughly insoluble. Sensitizer for tissue: 1 per cent to 1¼ per cent solution of bichromate of potash. Immerse 2 minutes. Print deeply; expose twice as long as ordinary paper print. Develop in hot water as usual.

Gum Bichromate

Gum Bichromate (Casper Millar). A.—Gum arabic, 1¼ ounces; water, 3½ ounces; salicylic acid, 4 grains.

B.—Chrome alum, 45 grains; water, 3½ ounces. Grind A and B with water and pigment, brush over paper, dry and store.

Suggested formula.—A, 2 ounces; B, 1½ drams; carbon black, 10 grains; sensitize for 2 minutes in 5 per cent bichromate solution.

Kallitype

Kallitype Sensitizer for Black Tones (J. Thomson).—Distilled water, 1 ounce; ferric oxalate (Merck's or Mallinckrodt's), 15 grains; citrate of iron and ammonia (brown scales), 25 grains; chloride of copper, 8 grains; oxalate of potassium, 35 grains; oxalic acid, 15 grains; silver nitrate, 15 grains; gum arabic, 10 grains. For greater contrast add 1 to 10 drops 5 per cent bichromate of potassium solution.

Developer: Stock Solution.—Distilled water, 1 ounce; silver nitrate, 40 grains; citric acid, 10 grains; oxalic acid, 10 grains. Filter. Normal developer 1 dram stock solution and 7 drams of water.

Platinum Papers

Platinum Sensitizer (P. L. Anderson).—Stock solutions: I. Water, hot, distilled, 2 ounces; ferric oxalate, 240 grains; oxalic acid, 16 grains. II. Water, hot, distilled, 2 ounces; ferric oxalate, 240 grains; oxalic acid, 16 grains; potassium chlorate, 4 grains. III. Water, distilled, 19 drams; potassium chloroplatinite, 219 grains (=½ ounce). Keep in amber glass bottles or in the dark. For use take: I, 22 mm.; II, 0 mm.; III, 24 mm. Gives very soft prints. Or I, 12 mm.; II, 10 mm.; III, 24 mm. Results about the same contrast as a P. O. P. print. Or I, 0 mm.; II, 22 mm.; III, 24 mm. Gives extreme contrast.

Above quantities sufficient for a 10 x 12 sheet of ordinary paper. Very smooth requires less and very rough more, up to 25 per cent additional. Apply with a soft fitch or camel-hair brush, allow to surface dry, and make bone-dry over a stove or gas jet. Should dry in not less than five or more than ten minutes.

Platinum: Sensitizing, Gold Bath and Sepia Papers. A.—Chloroplatinite of potassium, 15 grains; distilled water, 90 minims.

B.—Ferric oxalate, 21 grains; oxalic acid, 2 grains; distilled water, 183 minims. For cold bath paper, mix A and B, and add 15 minims of water. For sepia paper mix A and B and add 15 minims of a 5 per cent solution of mercuric chloride. The addition of a few grains of potassium chlorate to any of the above gives increased contrast in the print. From 140 to 170 minims of solution are sufficient to coat a sheet of paper 20 x 26 inches.

Platinum Prints: to Intensify. A.—Sodium formate, 45 grains; water, 1 ounce.

B.—Platinum perchloride, 10 grains; water, 1 ounce.

C.—For use, take 15 minims each of A and B to 2 ounces of water. Immerse prints until sufficiently intensified, then remove and wash.

Platinum Prints to Distinguish from Bromide.—Soak the print in saturated solution of mercuric chloride; a platinum print will not change; a bromide print will bleach.

Salted Papers

Salted Paper Prints: Sensitized with the following: Silver, 480 grains Troy; water, 11 ounces. Dissolve and pour off 2 ounces, and to the 9 ounces left add strong aqua ammonia to form a precipitate and redissolve the precipitate, then add the remaining 2 ounces which will form another precipitate; to this add 9 drops of nitric acid C. P. Apply this to the paper with a tuft of cotton.

Any good toning bath will give good results, such as—Chloride aluminum, 80 grains; bi-carbonate soda, 360 grains; water, 48 ounces. When mixed, this will form a flaky hydrate which will settle to the bottom. It can be strained through clean washed muslin. To prepare a small bath for toning, take 12 ounces of the stock solution and add sufficient gold to tone in 8 to 10 minutes. The gold solution must be neutralized with bi-carbonate soda before adding to the above bath. When the prints reach the desired tone, throw them into a bath of salt water, made of water, 1 gallon; table salt, 1 ounce.

Printing Out Papers

Gold Toning (B. H. Allbee).—No. 1, 10 per cent solution sulphocyanide of potassium; No. 2, 15 grains chloride of gold in 7½ ounces of water; No. 3, 10 per cent solution phosphate of soda; No. 4, saturated solution borax. Take No. 1, 1 dram; water, 8 drams; No. 2, 4 drams; No. 3, 1 dram; No. 4, 2 drams. In this put print in dry. Toning should be complete in two minutes. Wash as usual.

Gold Toning.—For blue-black tones, for slight strengthening, and

for converting rusty black into pure black. Soak prints in warm water, lay on warm glass, brush over glycerine and blot off. Pour on few minims of solution of gold chloride (1 grain per dram), and rapidly brush in all directions. When toned, rinse and sponge back and front with: Metol, 50 grains; sodium sulphite, 1 ounce; potassium carbonate, ½ ounce; water, 20 ounces. Tone in daylight. Do not tone sepias or old prints in this solution.

Gold Toning—To Give Black Tones (A. B. Klugh.)—Solution A. Sodium thiosulphate (hypo), 40 grams; water, 100 cc. Solution B. Lead nitrate, 5 grams; acetic acid, glacial, 5 cc.; water, 50 cc. Add to solution A enough of B to produce a slight milkiness. Filter and add 25 cc. of a 1% solution of gold chloride. Print deeply and tone until a warm black is produced.

Gold Toning Bath. (Alfred J. Jarman).—Filtered water, 30 oz. fluid; acetate of soda, 2 drams; bicarbonate of soda, 20 grains; chloride of gold, 4 grains.

MISCELLANÆ

Adhesive for Labels.—Soak 1 part of the best glue in water until thoroughly swollen, add a little sugar candy, 1 part of gum arabic and 6 parts of water. Boil with constant stirring over a spirit lamp until the whole gets thin. Coat sheets of paper with it; let dry and cut up into convenient sizes.

Blackening Mixture.—Dissolve a 4-ounce stick of licorice in 8 ounces of water with the aid of gentle heat. When dissolved rub into the mixture 1 ounce of burnt sienna in powder, using the back of a spoon for this purpose. When cold, bottle for use.

Bleaching Solution.—(Alfred J. Jarman). Water (ordinary), 20 oz. fluid, bichloride of mercury, 1 oz. fluid, potassium bromide, ¾ oz. fluid. Dissolve and filter the solution.

Cleaning Greasy Bottles.—Wash with benzine, or permanganate of potassium, to which has been added some hydrochloric acid.

Bottles that have contained resinous substances, wash with potash or soda and rinse with alcohol. Bottles that have contained essences, wash with sulphuric acid, then with water.

Clearing Stained Negatives.—Dissolve ⅛ ounce of pulverized alum in 20 ounces of water and add 1 dram of sulphuric acid. Immerse the stained plate in this solution for a few minutes; remove plate wash and then set in the rack to dry.

Film: to Remove from Glass: Make two solutions. A.—Sodium flouride, 6 grains; water, 4 ounces.

B.—Sulphuric acid, 6 drops; water, 1 ounce. Place the negative in solution A for 2 minutes and then place directly in solution B. After another 2 minutes lift the film with the finger from one corner of the plate. It will soon leave the glass.

Firelight Effects on Developing Paper (H. S. Hood). No. 1.—Water, 5 drams; copper sulphate, 10 per cent solution, 15 minims; ammonium carbonate, 10 per cent solution. Add till precipitate first formed is redissolved.

No. 2—Water, 4½ ounces; potassium ferricyanide, 6/10 drams. Mix separately and add No. 2 to No. 1. The print will turn bright red. Wash well.

Ground Glass: Substitutes for. 1.—Paraffine wax makes an excellent substitute for ground glass if the latter should get broken. Iron the paper onto a sheet of plain glass. It is more transparent than the focusing screen, and the image will appear clearer; hence, in exposing allowance must be made for the difference in illumination.

2.—Resin dissolved in wood alcohol and blown over the glass; this must not be scratched; it gives a very fine-grained ground glass effect.

3.—White wax, 120 grains; ether, 1 ounce.

Ground Glass Varnish: Sandarac, 90 grains; mastic, 20 grains; ether, 2 ounces. Dissolve the resins in the ether and add benzole ½ to 1½ ounces.

Lens: to Clean.—The lens should always be kept free from dust or other impurities. To clean it, spread upon a table a clean sheet of paper; take the lens apart, and with a camel-hair brush dust each of the combinations on both sides. If the surfaces of the lenses are very dirty and have lost their polish, make up the following: Nitric acid, 3 drops; alcohol, 1 ounce; distilled water, 2 ounces. Dip a tuft of filtering cotton in this solution, rub each side of the lens, then polish with an absolutely clean chamois. Clean the lens tube before replacing the lenses, each of which should be finally dusted with a camel-hair brush.

Mounting Without Cockling (W. S. Davis).—Coat back of dry print with as strong a solution of warm gelatine (pure table gelatine will do) as can be spread easily. Allow to dry, then attach to mount by dampening the amount with water, then lay print in desired position; cover with a sheet of bond or smooth paper, and apply a warm flat iron until the gelatine melts. Very effective for thin mounting material, as there is no cockling if the mount contains just the right amount of water.

Paste, Starch (A. Lomax).—Powdered starch, 1 ounce; cold water, 12 ounces. Mix smooth with a glass rod, heat to boiling point. Boil half a minute stirring all the time. Use cold.

Poisons and Antidotes.—Administer the antidote as soon as possible. If a strong acid or alkali, or cyanide of potassium, has been swallowed, lukewarm water in large quantities should be swallowed at once. Where strong acids or alkalies have not been swallowed, rid the stomach of the poison by vomiting; for this purpose take 25 grains of zinc sulphate in warm water.

Polished surfaces: to Photograph.—Smear the surface with soft putty so as to deaden the reflections. Photograph the article against a black background and stop off all reflections, allowing the light to come from one direction only. To photograph hollow cut glassware, fill with ink or aniline black water dye. Before photographing machinery deaden the bright parts with putty.

Stains: to Remove from the Hands.—Developer stains: solution of citric or oxalic acid. Silver nitrate stains: Water, 4 ounces; chloride of lime, 350 grains; sulphate of soda, 1 ounce. Apply with a brush.

Test for Hypo: Potassium permanganate, 2 grains; potassium carbonate, 20 grains; distilled water, 40 ounces. Soak the plate or print to be treated in water for one hour, then remove and add to the water a few drops of the above solution, which will turn a greenish yellow or brown if the water is not free from hypo.

COMPARISON OF VALUES
COMPILED BY CHAS. LE B. GOELLER

Taking for a standard f.8 as a unit of measurement.

Speed increased.	Opening twice as fast.					
f:8 = 1	Twice as fast	as	f:11.3	exposure	1	sec.
7.5 = 1⅛	"	as	10.6	"	0.88	"
6.8 = 1⅜	"	as	9.6	"	0.725	"
6.3 = 1 3-5	"	as	8.8	"	0.625	"
6. = 1 7-9	"	as	8.5	"	0.5625	"
5.6 = 2	"	as	8	"	0.5	"
4.5 = 3 1-6	"	as	6.3	"	0.3125	"

UNITED STATES WEIGHTS AND MEASURES

According to Existing Standards

LINEAR

	Inches	Feet	Yards	Rods	Fur's	Mi.
12 inches = 1 foot.	12	1				
3 feet = 1 yard.	36	3	1			
5.5 yards = 1 rod.	198	16.5	5.5	1		
40 rods = 1 furlong.	7,920	660	220	40	1	
8 furlongs = 1 mile.	63,360	5,280	1,760	320	8	1

SURFACE—LAND

	Feet	Yards	Rods	Roods	Acres
144 sq. ins. = 1 sq. ft.					
9 sq. ft. = 1 sq. yd.	9	1			
30.25 sq. yds. = 1 sq. rod.	272.25	30.25	1		
40 sq. rods = 1 sq. rood.	10,890	1,210	40	1	
4 sq. roods = 1 acre.	43,560	4,840	160	4	1
640 acres = 1 sq. mile.	27,878,400	3,097,600	102,400	2,560	640

VOLUME—LIQUID

	Gills	Pints	Gallon	Cub. In.
4 gills = 1 pint.	32	8	1	231
2 pints = 1 quart.				
4 quarts = 1 gallon.				

FLUID

Gallon	Pints	Ounces	Drachms	Minims	Cubic Centimetres
1	8	128	1,024	61,440	3,785,435
	1	16	128	7,680	473,179
		1	8	480	29,574
			1	60	3,697

16 ounces, or a pint, is sometimes called a fluid pound.

TROY WEIGHT

Pound	Ounces	Pennyweights	Grains	Grams
1	12	240	5,760	373.24
	1	20	480	31.10
		1	24	1.56

APOTHECARIES' WEIGHT

lb. Pound	℥ Ounces	ʒ Drachms	℈ Scruples	gr. Grains	Grams
1	12	96	288	5,760	373.24
	1	8	24	480	31.10
		1	3	60	3.89
			1	20	1.30
				1	.06

The pound, ounce, and grain are the same as in Troy weight.

AVOIRDUPOIS WEIGHT

Pound	Ounces	Drachms	Grains (Troy)	Grams
1	16	256	7,000	453.60
	1	16	437.5	28.35
		1	27.34	1.77

ENGLISH WEIGHTS AND MEASURES

APOTHECARIES' WEIGHT

20 Grains	=	1 Scruple	=	20 Grains.
3 Scruples	=	1 Drachm	=	60 Grains.
8 Drachms	=	1 Ounce	=	480 Grains.
12 Ounces	=	1 Pound	=	5,760 Grains.

FLUID MEASURE

60 Minims	=	1 Fluid Drachm
8 Drachms	=	1 Fluid Ounce
20 Ounces	=	1 Pint
8 Pints	=	1 Gallon

The above weights are usually adopted in formulas.

All Chemicals are usually sold by

AVOIRDUPOIS WEIGHT

$27^{11}/_{32}$	Grains	=	1 Drachm	=	$27^{11}/_{32}$	Grains
16	Drachms	=	1 Ounce	=	437½	Grains
16	Ounces	=	1 Pound	=	7,000	Grains

Precious Metals are usually sold by

TROY WEIGHT

24 Grains	=	1 Pennyweight	=	24 Grains
20 Pennyweights	=	1 Ounce	=	480 Grains
12 Ounces	=	1 Pound	=	5,760 Grains

NOTE.—An ounce of metallic silver contains 480 grains, but an ounc of nitrate of silver contains only 437½ grains.

UNITED STATES FLUID MEASURE

Gal.	Pints.	Ounces.	Drachms.	Mins.	Cub. In.	Grains.	Cub. C.M.
1	= 8	= 128	= 1,024	= 61,440	= 231.	= 58,328.886	= 3,785.44
	1	= 16	= 128	= 7,680	= 28.875	= 7,291.1107	= 473.18
		1	= 8	= 480	= 1.8047	= 455.6944	= 29.57
			1	= 60	= 0.2256	= 56.9618	= 3.70

IMPERIAL BRITISH FLUID MEASURE

Gal.	Pints.	Ounces.	Drachms.	Mins.	Cub. In.	Grains.	Cub. C.M
.	= 8	= 160	= 1,280	= 76,800	= 277.27384	= 70,000	= 4,543.732
	1	= 20	= 160	= 9,600	= 34.65923	= 8,750	= 567.966
		1	= 8	= 480	= 1.73296	= 437.5	= 28.398
			1	= 60	= 0.21662	= 54.69	= 3.550

METRIC SYSTEM OF WEIGHTS AND MEASURES

MEASURES OF LENGTH

Denominations and Values		Equivalents in Use	
Myriameter	10,000 meters.	6.2137	miles.
Kilometer	1,000 meters.	.62137	mile, or 3,280 ft. 10 ins
Hectometer	100 meters.	328.	feet and 1 inch.
Dekameter	10 meters.	393.7	inches.
Meter	1 meter.	39.37	inches.
Decimeter	1-10th of a meter.	3.937	inches.
Centimeter	1-100th of a meter.	.3937	inch.
Millimeter	1-1000th of a meter.	.0394	inch.

MEASURES OF SURFACE

Denominations and Values		Equivalents in Use	
Hectare	10,000 square meters.	2.471	acres.
Are	100 square meters.	119.6	square yards.
Centare	1 square meter.	1,550.	square inches

MEASURES OF VOLUME

Denominations and Values			Equivalents in Use	
Names	No. of Liters	Cubic Measures	Dry Measure	Wine Measure
Kiloliter or stere	1,000	1 cubic meter.	1.308 cubic yards.	264.17 gallons.
Hectoliter	100	1-10th cubic meter.	2 bu. and 3.35 pecks.	26.417 gallons.
Dekaliter	10	10 cubic decimeters.	9.08 quarts.	2.6417 gallons
Liter	1	1 cubic decimeter.	.908 quart.	1.0567 quarts.
Deciliter	1-10	1-10th cubic decimeter.	6.1023 cubic inches.	.845 gill.
Centiliter	1-100	10 cubic centimeters	.6102 cubic inch.	.338 fluid oz
Milliliter	1-1000	1 cubic centimeter.	.061 cubic inch.	.27 fl. drm.

WEIGHTS

Denominations and Values			Equivalents in Use	
Names	Number of Grams	Weight of Volume of Water at its Maximum Density	Avoirdupois Weight	
Millier or Tonneau	1,000,000	1 cubic meter.	2204.6	pounds.
Quintal	100,000	1 hectoliter.	220.46	pounds.
Myriagram	10,000	10 liters.	22.046	pounds.
Kilogram or Kilo	1,000	1 liter.	2.2046	pounds.
Hectogram	100	1 deciliter.	3.5274	ounces.
Dekagram	10	10 cubic centimeters.	.3527	ounce.
Gram	1	1 cubic centimeter.	15.432	grains.
Decigram	1-10	1-10th of a cubic centimeter.	1.5432	grain.
Centigram	1-100	10 cubic millimeters.	.1543	grain.
Milligram	1-1000	1 cubic millimeter.	.0154	grain.

For measuring surfaces, the square dekameter is used under the term of ARE; the hectare, or 100 ares, is equal to about 2½ acres. *The unit of capacity* is the cubic decimeter or LITER, and the series of measures is formed in the same way as in the case of the table of lengths. The cubic meter is the unit of measure for solid bodies, and is termed STERE. *The unit of weight* is the GRAM, which is the weight of one cubic centimeter of pure water weighed in a vacuum at the temperature of 4 deg. Cent. or 39.2 deg. Fahr., which is about its temperature of maximum density. In practice, the term cubic centimeter, abbreviated c.c., is generally used instead of milliliter and cubic meter instead of kiloliter.

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH MEASURE

1 cubic centimeter	= 17 minims					
2 cubic centimeters	= 34 "					
3 "	= 51 "					
4 "	= 68 "	or	1 dram	8 minims		
5 "	= 85 "	"	1 "	25 "		
6 "	= 101 "	"	1 "	41 "		
7 "	= 118 "	"	1 "	58 "		
8 "	= 135 "	"	2 drams	15 "		
9 "	= 152 "	"	2 "	32 "		
10 "	= 169 "	"	2 "	49 "		
20 "	= 338 "	"	5 "	38 "		
30 "	= 507 "	"	1 ounce	0 dram	27 minims	
40 "	= 676 "	"	1 "	3 drams	16 "	
50 "	= 845 "	"	1 "	6 "	5 "	
60 "	= 1014 "	"	2 ounces	0 "	54 "	
70 "	= 1183 "	"	2 "	3 "	43 "	
80 "	= 1352 "	"	2 "	6 "	32 "	
90 "	= 1521 "	"	3 "	1 "	21 "	
100 "	= 1690 "	"	3 "	4 "	10 "	
1000 "	= 1 liter =		35 "	1 "	40 "	

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH WEIGHT

The following table, which contains no error greater than one-tenth of a grain, will suffice for most practical purposes.

1 gram	= 15⅖ grains.			
2 grams	= 30⅘ "			
3 "	= 46⅕ "			
4 "	= 61⅘ "	........or	1 dram	1⅘ grain
5 "	= 77⅕ "	........"	1 "	17⅕ grains
6 "	= 92⅗ "	........"	1 "	32⅗ "
7 "	= 108 "	........"	1 "	48 "
8 "	= 123⅖ "	........"	2 drams	3⅖ "
9 "	= 138⅘ "	........"	2 "	18⅘ "
10 "	= 154⅖ "	........"	2 "	34⅖ "
11 "	= 169⅘ "	........"	2 "	49⅘ "
12 "	= 185⅕ "	........"	3 "	5⅕ "
13 "	= 200⅗ "	........"	3 "	20⅗ "
14 "	= 216 "	........"	3 "	36 "
15 "	= 231⅗ "	........"	3 "	51⅗ "
16 "	= 247 "	........"	4 "	7 "
17 "	= 262⅖ "	........"	4 "	22⅖ "
18 "	= 277⅘ "	........"	4 "	37⅘ "
19 "	= 293⅕ "	........"	4 "	53⅕ "
20 "	= 308⅗ "	........"	5 "	8⅗ "
30 "	= 463 "	........"	7 "	43 "
40 "	= 617⅕ "	........"	10 "	17⅕ "
50 "	= 771⅗ "	........"	12 "	51⅗ "
60 "	= 926 "	........"	15 "	26 "
70 "	= 1080⅕ "	........"	18 "	0⅕ "
80 "	= 1234⅗ "	........"	20 "	34⅗ "
90 "	= 1389 "	........"	23 "	9 "
100 "	= 1543⅕ "	........"	25 "	43⅕ "
1000 "	= 1 kilogram = 32 oz., 1 dr., 12⅖ gr.			

THE ELEMENTS:

THEIR NAMES, SYMBOLS, AND ATOMIC WEIGHTS OXYGEN STANDARD.

Compiled by HENRY F. RAESS.

1915

Element	Symbol	Weight	Element	Symbol	Weight	Element	Symbol	Weight
Aluminum	Al	27.10	Holmium	Ho	163.50	Rhodium	Rh	102.90
Antimony	Sb	120.20	Hydrogen	H	1.008	Rubidium	Rb	85.45
Argon	A	39.88	Indium	In	114.80	Ruthenium	Ru	101.70
Arsenic	As	74.96	Iodine	I	126.92	Samarium	Sa	150.40
Barium	Ba	137.37	Iridium	Ir	193.10	Scandium	Sc	44.10
Bismuth	Bi	208.00	Iron	Fe	55.84	Selenium	Se	79.20
Boron	B	11.00	Krypton	Kr	82.92	Silicon	Si	28.30
Bromine	Br	79.92	Lanthanum	La	139.00	Silver	Ag	107.88
Cadmium	Cd	112.40	Lead	Pb	207.10	Sodium	Na	23.00
Caesium	Cs	132.81	Lithium	Li	6.94	Strontium	Sr	87.63
Calcium	Ca	40.07	Lutecium	Lu	174.00	Sulphur	S	32.07
Carbon	C	12.00	Magnesium	Mg	24.32	Tantalum	Ta	181.50
Cerium	Ce	140.25	Manganese	Mn	54.93	Tellurium	Te	127.50
Chlorine	Cl	35.46	Mercury	Hg	200.60	Terbium	Tb	159.20
Chromium	Cr	52.00	Molybdenum	Mo	96.00	Thallium	Tl	204.00
Cobalt	Co	58.97	Neodymium	Nd	144.30	Thorium	Th	232.40
Columbium	Cb	93.50	Neon	Ne	20.20	Thulium	Tm	168.50
Copper	Cu	63.57	Nickel	Ni	58.68	Tin	Sn	119.00
Dysprosium	Dy	162.50	Niton	Nt	222.40	Titanium	Ti	48.10
Erbium	Er	167.70	Nitrogen	N	14.01	Tungsten	W	184.00
Europium	Eu	152.00	Osmium	Os	190.90	Uranium	U	238.50
Fluorine	F	19.00	Oxygen	O	16.00	Vanadium	V	51.00
Gadolinium	Gd	157.30	Palladium	Pd	106.70	Xenon	Xe	130.20
Gallium	Ga	69.90	Phosphorus	P	31.04	Ytterbium	Yb	173.50
Germanium	Ge	72.50	Platinum	Pt	195.20	Yttrium	Yt	89.00
Glucinum	Gl	9.10	Potassium	K	39.10	Zinc	Zn	65.37
Gold	Au	197.20	Praseodymium	Pr	140.60	Zirconium	Zr	90.60
Helium	He	3.96	Radium	Ra	226.40			

TABLE OF COMPARATIVE PLATE SPEED NUMBERS

H & D	Watkins P No.	Wynne F No.	H & D	Watkins P No.	Wynne F No.
10	15	24	220	323	114
20	30	35	240	352	120
40	60	49	260	382	124
80	120	69	280	412	129
100	147	77	300	441	134
120	176	84	320	470	138
140	206	91	340	500	142
160	235	98	380	558	150
200	294	109	400	588	154

The above Watkins and Wynne numbers are equivalent to the H and D, only when the latter is determined in accordance with the directions of Hurter and Driffield, that is with pyro-soda developer and using the straight portion only of the density curve.

To convert H and D into Watkins: Multiply H and D by 50 and divide by 34. For all practical purposes the Watkins P number is 1½ times H and D.

To convert Watkins into Wynne F Nos.: Extract the square root and multiply by 6.4.

The above methods have been approved by the Watkins Meter Company and the Infallible Exposure Meter Company.

THERMO DEVELOPMENT

Reprinted by permission from Thermo Development Chart, published by the American Photographic Publishing Company, Boston 17, Mass.

TABLE OF TEMPERATURES

Degrees Fahrt.	Min. Tray T.C.1.9.	Min. Tank T.C.1.9.	Min. Tray T.C.2.6	Min. Tank T.C.2.6
80	3¼	12	1¾	7¾
78	3½	13	2	8½
76	3¾	14	2¼	9½
74	4	15	2½	10¾
72	4¼	16	2¾	11¾
70	4½	17	3	13
68	5	18½	3¼	14½
66	5¼	19½	3¾	16
64	5¾	21	4	18
62	6¼	22½	4½	20
60	6½	24	5	22
58	7	26	5½	24½
56	7½	28	6	27
54	8	30	6½	30
52	8½	32	7½	33
50	9¼	34	8½	37
48	10	37	9½	41½
46	10¾	40	10½	46
44	11½	43	11½	51½
42	12¼	46	12¾	57
40	13¼	49	14½	63

TABLE OF DEVELOPMENT SPEEDS

ANSCO FILM, MS. BARNET—Super-speed Ortho, M; Extra Rapid Ortho, MS. Red Seal, M; Red Diamond, MS; Self-screen Ortho, MS; CENTRAL—Special XX., S; Special, M; Comet, M; Colornon, MQ; Panortho, MQ; CRAMER—Crown S; Anchor, MQ; Banner X, S; Inst. Iso., MQ; Med. Iso, MQ; Commercial Isonon, MQ; Portrait Isonon, M; Trichromatic, MQ; Spectrum, MQ; Slow Iso, MQ; Contrast, VVQ. ENSIGN FILM, MS. HAMMER—Special Extra Fast, MS; Extra Fast, M; Aurora Extra Fast, MS; Ortho Extra Fast, M; Ortho Nonhal., M; Fast, MQ; Slow, VQ. Ortho Slow, VQ. ILFORD—Monarch, VS; Zenith, VS; Special Rapid, VS; Rapid Chromatic, M; Ordinary, Q. IMPERIAL—Flash Light, M; Special Sensitive, MQ; Orthochrome S.S., MQ; Special Rapid, S; Orthochrome S.R., MS; Non-filter, MQ. KODAK—Speed Film, S; N.C. Film, S; Portrait Film, S. MARION—Record, S; P.S.; MS. PAGET—XXX M; XXXXX, MS; Swift., S; Ex. Spec. Rap., S; Ortho. Ex. Spec. Rap., MQ; Panchro Ord., Q; Panchro. Color, VQ; Spec. Rap., S; Hydra Panchro., MQ; Hydra Rapid, MQ. PREMO FILM PACK—S. SEED—Graflex, S; 30 Gilt Edge, MS; 26 X, MS; 23, MQ; L Ortho, MQ; Non-halation, MQ; Panchromatic, VQ. STANDARD—Extra, Orthonon, MQ; Polychrome, MQ. STANLEY—50, M; Commercial, MQ. WELLINGTON—Extreme, S; 'Xtra Speedy, MS; Film, MS; Iso Speedy, M; Portrait Speedy, M; Anti-Screen, M; Speedy Spec. Rap., M; Ortho Process, M; Wratten—Panchro, MQ; Process Panchro, Q.

WATKINS THERMO PYRO-SODA T. C. 1.9

a.	Potassium metabisulphite	80 gr.	= 5.2 gm
	Pyro	160 gr.	= 10.4 -
	Sodium sulphite, dry	1 oz.	= 28.35
	Water to make	10 oz.	= 295cc
b.	Sodium carbonate, dry	2 oz.	= 56.7 gm
	Potassium bromide	40 gr.	= 2.6 -
	Water to make	10 oz.	= 295cc

MODIFIED THERMO M. Q. T. C. 1.9

a.	Potassium metabisulphite	60 gr.	= 3.9 gm
	Metol	30 gr.	= 1.95 -
	Hydrochinon	90 gr.	5.75 -
	Water to make	20 oz.	590cc
b.	Sodium sulphite, dry	1 oz.	28.35gm
	Sodium carbonate, dry	1½ oz.	42.5 -
	Water to make	20 oz.	590cc

MODIFIED THERMO D. Q. T. C. 2.6

a.	Potassium metabisulphite	60 gr	3.9
	Duratol	30 gr.	1.95
	Hydrochinon	90 gr.	5.85
	Water to make	20 oz.	590cc
b.	Sodium sulphite, dry	1½ oz.	42.5
	Sodium carbonate, dry	2 oz.	56.7
	Water to make	20 oz.	590

INSTRUCTIONS.—Look up the Development Speed of the plate or film and mix the developer as directed for that class, USING WATER WHICH HAS STOOD IN THE ROOM LONG ENOUGH TO ATTAIN ROOM TEMPERATURE. In safe ruby light (or total darkness) place the plate in the tray, flow it with developer, cover the tray light-tight, and note the time. We recommend handling plates in total darkness and using white light while they are covered. Now observe the temperature of the room and consult the Table of Temperatures, where the correct time for development will be found opposite the degree and under the Temperature-Coefficient of the developer in use. The tray may be rocked now and then during development, but the plate should not be removed from the solution until the time is up. Then turn out the white light and rinse and fix the plate by safe light or in a covered tank.

If the first trial does not give the right printing quality to suit your requirements, classify the plate one class nearer VS for more or one class farther from VS for less contrast.

DILUTION OF DEVELOPER.—	VVQ	VQ	Q	MQ	M	MS	S	VS
Watkins Thermo Pyro-Soda....	1	1⅓	1¾	2¼	3	4	5	6¾
Modified Thermo M.-Q....... / Modified Thermo Duratol.....	1⅓	2	2⅔	3½	4½	6	8	10

drams of each stock to be diluted to make total volume 3 ounces for tray or 10 ounces for tank development.

Rodinal (Citol, Azol, Certinal)..	20	26	35	45	60	80	105	135

minims solution to be made up to 3 ounces for tray or 9 ounces for tank. T. C. 1.9.

Dilution of Dev.	V VQ	V Q	Q	M Q	M	M S	S	V S
Metabisulphite grs. Potass......	1.68	• 2¼	3.	4.	5.	6.8	9.	12.
Metol........	.84 } or 1.68	1⅛ } or 2¼	1½ } or 3	2. } or 4	2½ } or 5	3.4 } 6.8	4½ } or 9	6 } 12
Hydrochinon..	2.52 } 1.68	3⅜ } 2¼	4½ } 3	6. } 4	7½ } 5	10.2 } 6.8	13½ } 9	18 } 12
Sod. Sulphite..	12.5	16½	22.	28.	37.	50.	66.	82.
Sod. Carbonate	18.75	24½	33.	42.	55.	70.	99.	123.
Water........	30 ℥	30 ℥	30 ℥	30 ℥	30 ℥	30 ℥	30 ℥	30 ℥

*For flashlight pictures equal parts of Hydrochinon and Eikonogen give softer effects.

N.B.—A single portion of developer should be used for only one plate, but the used developer (except pyro) should be saved for paper. If fog occurs, add to each ounce of water used for diluting, 7½ to 10 grs. dry sulphite.

Dickeson's Studio.

TABLE FOR CALCULATING DISTANCES IN ENLARGING OR REDUCING

From The British Journal Photographic Almanac

Focus of Lens	Times of Enlargement and Reduction							
Inches	1 Inch	2 Inches	3 Inches	4 Inches	5 Inches	6 Inches	7 Inches	8 Inches
2..........	4 4	6 3	8 2 2/3	10 2 1/2	12 2 2/5	14 2 1/3	16 2 2/7	18 2 1/4
2 1/2........	5 5	7 1/2 3 3/4	10 3 1/3	12 1/2 3 1/8	15 3	17 1/2 2 9/10	20 2 6/7	22 1/2 2 13/16
3..........	6 6	9 4 1/2	12 4	15 3 3/4	18 3 3/5	21 3 1/2	24 3 3/7	27 3 3/8
3 1/2........	7 7	10 1/2 5 1/4	14 4 2/3	17 1/2 4 3/8	21 4 1/5	24 1/2 4 1/12	28 4	31 1/2 3 9/10
4..........	8 8	12 6	16 5 1/3	20 5	24 4 4/5	28 4 2/3	32 4 4/7	36 4 1/2
4 1/2........	9 9	13 1/2 6 3/4	18 6	22 1/2 5 3/5	27 5 2/5	31 1/2 5 1/4	36 5 1/7	40 1/2 5 1/16
5..........	10 10	15 7 1/2	20 6 2/3	25 6 1/4	30 6	35 5 5/6	40 5 5/7	45 5 5/8
5 1/2........	11 11	16 1/2 8 1/4	22 7 1/3	27 1/2 6 4/5	33 6 1/2	38 1/2 6 5/12	44 6 2/7	49 1/2 6 3/16
6..........	12 12	18 9	24 8	30 7 1/2	36 7 1/5	42 7	48 6 6/7	54 6 3/4
7..........	14 14	21 10 1/2	28 9 1/3	35 8 3/4	42 8 2/5	49 8 1/6	56 8	63 7 7/8
8..........	16 16	24 12	32 10 2/3	40 10	48 9 3/5	56 9 1/3	64 9 1/7	72 9
9..........	18 18	27 13 1/2	36 12	45 11 1/4	54 10 4/5	63 10 1/2	72 10 2/7	81 10 1/8

The object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical center. The use of the table will be seen from the following illustration: A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of 6 inches equivalent focus. He must therefore look for 4 on the upper horizontal line and for 6 on the first vertical column and carry his eye to where these two join, which will be 30-7½. The greater of these is the distance the sensitive plate must be from the center of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times, the same method must be followed; but in this case the greater number will represent the distance between the lens and the picture to be copied, the latter that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction

If the focus of the lens be 12 inches, as this number is not in the column of focal lengths, look out for 6 in this column and multiply by 2, and so on with any other numbers.

TABLES OF DISTANCES AT AND BEYOND WHICH ALL OBJECTS ARE IN FOCUS WHEN SHARP FOCUS IS SECURED ON INFINITY

Focal Length of Lens in Inches	Ratio marked on Stops — Number of feet after which all is in focus													
	f/4	f/5.6	f/6	f/7	f/8	f/10	f/11	f/15	f/16	f/20	f/22	f/32	f/44	f/64
4	33	24	22	19	17	13	12	9	8	7	6	4	3	2
4¼	38	27	25	21	19	15	14	10	10	7	7	5	3½	2½
4½	42	30	28	24	21	17	15	11	11	8½	7½	5½	4	3
4¾	47	34	31	27	24	19	17	12	12	9½	8½	6	5	3
5	52	36	35	30	26	21	19	14	13	10½	9½	6½	5½	3½
5¼	57	40	38	33	28	23	21	15	14	11½	10½	7	5½	3½
5½	63	45	43	36	31	25	23	17	15	12½	11½	7½	6	4
5¾	68	50	46	38	34	27	25	18	17	13½	13	8½	6½	4
6	75	54	50	42	38	30	28	20	19	15	14	9	7	4½
6¼	81	58	54	46	40	32	29	22	20	16	15	10	7½	5
6½	87	62	58	50	44	35	32	23	22	17½	16	11	8	5½
6¾	94	67	63	54	47	38	34	25	24	19	17	12	8½	6
7	101	72	68	58	51	40	37	27	25	20	18	12½	9	6
7¼	109	78	73	62	54	44	39	29	27	22	20	13½	10	6½
7½	117	83	78	64	58	47	42	31	29	24	21	14½	10½	7
7¾	124	90	83	71	62	50	45	33	31	25	22	15½	11	7½
8	132	96	88	76	68	52	48	36	32	28	24	16	12	8
8¼	141	100	94	80	71	56	51	37	35	29	25	17½	12½	8½
8½	150	104	100	84	76	60	56	40	38	30	27	19	13½	9
8¾	156	111	104	89	78	63	57	42	39	32	29	20	14	10
9	168	120	112	96	84	67	61	45	42	34	31	21	15	10½
9¼	180	127	116	101	90	71	65	47	45	35	32	22	16	11
9½	190	133	125	107	95	75	68	50	47	37	34	24	17	12
9¾	197	141	131	113	99	79	72	52	50	39	36	25	18	12½
10	208	148	140	120	104	83	75	55	52	42	38	26	19	13

If sharp focus is secured on any of the distances shown, then with the stop indicated all objects are in focus from half the distance focused on up to infinity.

LENGTH OF STUDIO

REQUIRED FOR LENSES OF DIFFERENT FOCAL LENGTHS FROM 6 TO 8 FEET IS ALLOWED FOR THE CAMERA AND OPERATOR

From "Photographic Lenses" by BECK and ANDREWS

Focus of Lens	Size	Kind of Portrait	Length of Studio	Dist. of Lens from Object
Inches			In Feet	In Feet
6	Carte de Visite 3¼x4¼	Full Length	18 to 20	11 to 12
7½	Carte de Visite	Full Length	22 to 25	14 to 15
8½	Carte de Visite	Full Length	24 to 28	17 to 19
		Bust	10 to 15	5
9½	Cabinet and smaller groups	Full Length	20 to 23	12 to 13
		Bust	12 to 17	7
11	Cabinet and 5x7 groups	Full Length	25 to 30	17 to 18
		Bust	13 to 20	8
14½	Cabinets, panels and 6½x8½ groups	Full Length	32 to 40	23 to 24
		Bust	14 to 20	7
19	10x12 portraits or groups	Full Length	20 to 25	13
		Bust	14 to 20	7
24	16x20 portraits or groups	Full Length	25 to 30	14
		Bust	14 to 20	8

"UNIFORM SYSTEM" NUMBERS FOR STOPS FROM $\frac{f}{1}$ TO $\frac{f}{100}$

In the following table Mr. S. A. Warburton calculated the exposure necessary with every stop from $\frac{f}{1}$ to $\frac{f}{100}$ compared with the unit stop of the "uniform system" of the Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from $\frac{f}{4}$, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.	*f*	U. S. No.	*f*	U. S. No.
1	1/16	15	14.06	58	210.25
1¼	.097	16	16	59	217.56
1.414	⅛	17	18.06	60	225.00
1½	.140	18	20.25	61	232.56
1¾	.191	19	22.56	62	240.25
2	¼	20	25.00	63	248.06
2¼	.316	21	27.56	64	256
2½	.390	22	30.25	65	264.06
2.828	½	22.62	32	66	272.25
2¾	.472	23	33.06	67	280.56
3	.562	24	36.00	68	289.00
3¼	.660	25	39.06	69	297.56
3½	.765	26	42.25	70	306.25
3¾	.878	27	45.56	71	315.06
4	1	28	49.00	72	324.00
4¼	1.12	29	52.56	73	333.06
4½	1.26	30	56.25	74	342.25
4¾	1.41	31	60.06	75	351.56
5	1.56	32	64	76	361.00
5¼	1.72	33	68.06	77	370.56
5½	1.89	34	72.25	78	380.25
5.656	2	35	76.56	79	390.06
5¾	2.06	36	81.00	80	400.00
6	2.25	37	85.56	81	410.06
6¼	2.44	38	90.25	82	420.25
6½	2.64	39	95.06	83	430.56
6¾	2.84	40	100.00	84	440.00
7	3.06	41	105.06	85	451.56
7¼	3.28	42	110.25	86	462.25
7½	3.51	43	115.56	87	473.06
7¾	3.75	44	121.00	88	484.00
8	4	45	126.56	89	495.06
8¼	4.25	45.25	128	90	506.25
8½	4.51	46	132.25	90.50	512
8¾	4.78	47	138.06	91	517.56
9	5.06	48	144.00	92	529.00
9¼	5.34	49	150.06	93	540.56
9½	5.64	50	156.25	94	552.25
9¾	5.94	51	162.56	95	564.06
10	6.25	52	169.00	96	576.00
11	7.56	53	175.56	97	588.06
11.31	8	54	182.25	98	600.25
12	9.00	55	189.06	99	612.56
13	10.56	56	196.00	100	625
14	12.25	57	203.06		

American Photographic Societies

This list is compiled from information received from an inquiry form sent to the societies during the latter half of 1923. It includes many societies not given in the 1923 Annual, but falls short of completeness as a record of the photographic societies of America. Secretaries of societies not here listed are urged to send us particulars of their organization so that the list may be fully representative of society activities.—Editor.

THE ACADEMY OF SCIENCE AND ART OF PITTSBURGH, PHOTOGRAPHIC SECTION, SPONSOR OF THE PITTSBURGH SALON—Headquarters, Carnegie Institute, Schenley Park. Organized January 23, 1900. Membership 100. Meetings, second and fourth Tuesdays in each month at Carnegie Institute. *President,* O. C. Reiter, 2424 Penn Avenue, Pittsburgh, Pa.; *Vice-President,* N. S. Woolridge, 836 South Linden Avenue, Pittsburgh, Pa.; *Print Director,* S. A. Martin, 1011 Heberton Avenue, Pittsburgh, Pa.; *Lantern Slide Director,* L. C. Rennie, Box 151, Wilkinsburg, Pa.; *Secretary-Treasurer,* P. F. Squier, 237 Avenue B, Westinghouse Plan, East Pittsburgh, Pa. *Executive Committee,* C. E. Beeson, F. O. Van Gorder, W. C. Mellor, O. C. Reiter, P. F. Squier.

ALLENTOWN CAMERA CLUB—Allentown, Pa. Headquarters, 533 Hamilton Street. *President* Nevin Yoder; *Vice-President,* David Knauso; Secretary, Chas. Ravert, 1011 So. Sixth Street, Allentown, Pa. Member Associated Camera Clubs of America. Meetings every Tuesday. Membership 60.

AMERICAN INSTITUTE PHOTOGRAPHIC SECTION—New York City. Headquarters, 322-324 West 23d Street. Established March 26, 1859. Stated meetings, first and third Mondays of each month. No meetings during Summer months. *Chairman,* Oscar G. Mason; *Vice-Chairman,* Robert A. B. Dayton; *Treasurer,* James Y. Watkins; *Secretary,* John W. Bartlett, M.D., F.R.P.S., 149 West 94th Street.

ASSOCIATED CAMERA CLUBS OF AMERICA—Headquarters, Arno Building, Fourth & Sycamore Sts., Cincinnati, Ohio. *President,* M. R. Witt, Photographic Society of Philadelphia; *Vice-President,* L. F. Bucher, Newark Camera Club; *Secretary,* C. H. Carpenter, Camera Club of Cincinnati; *Treasurer,* H. W. Greene, Camera Club of Cincinnati: *Board of Directors,* W. A. Alcock, Pictorial Photographers of America; Raymond Trowbridge, Chicago Camera Club; J. L. Tormey, Photographic Club of Baltimore; R. M. Crater, Orange Camera Club; J. C. Stick, So. California Camera Club; C. M. Jaquith, Portland (Me.) Camera Club. Association Print Director, C. H. Partington, Cincinnati, Ohio. Motive—Closer affiliation of Camera Clubs, Annual exhibits, Interchanges of prints and slides, as well as ideas, literature and the general promotion of artistic photography through the medium of the Camera Club or Photographic Society. Membership, thirty-four clubs. Association organized May 1, 1919. Correspondence invited with non-member organization and those desiring to form a club or society.

BERKSHIRE PHOTOGRAPHIC SOCIETY—Headquarters, care of A. W. Jacobs Studio, 30 North Street. Pittsfield, Mass. Meetings 2nd Friday of each month. Member Associated Camera Clubs of America.

BLUE BELL CAMERA CLUB—Detroit, Mich. Headquarters, 1365 Cass Avenue. *President,* E. J. Arnold; *Vice-President,* C. C. Ashbaugh; *Treasurer,* Miss Elsie Wohlgehagen; *Corresponding Secretary,* Miss H. I. Quick, 1905 W. Grand Boulevard; *Secretary,* Wm. B. Kemp, 9236 Genessee Avenue.

BOSTON CAMERA CLUB—Boston, Mass. Established 1881. Incorporated 1886. Membership, 75. *President,* P. Hubbard; *Secretary,* John H. Thurston, 234 Boylston Street.

BOSTON YOUNG MEN'S CHRISTIAN UNION CAMERA CLUB—Boston, Mass. Headquarters, 48 Boylston Street, Boston. Organized, 1908. *President,* Gustav H. Seelig; *Vice-President,* Col. James M. Andrews; *Secretary-Treasurer,* Livingston Stebbins, 6 Beacon Street, Boston, Mass. Meetings first Tuesday each month at club rooms, 48 Boylston Street. Member Associated Camera Clubs of America.

BOULDER CAMERA CLUB--Care of University of Colorado, Boulder, Colo. *President,* Severance Burrage.

BROOKLYN INSTITUTE OF ARTS AND SCIENCES, PHOTOGRAPHIC SECTION—Headquarters, Academy of Music Building, Lafayette Avenue, Brooklyn, N. Y. Organized 1886. Membership 75. Meetings for general discussion and criticism the second Monday each month except July and August. Courses in Rudiments of Photography, Advanced Photography, Pictorial Photography, Loan Exhibitions. Annual exhibit of the Depart-

ment in May. Demonstrations of the various processes every third Friday evening. *President,* Wm. Elbert Macnaughton; *Vice-President,* Wm. Alexander Alcock; *Secretary,* Sophie Louisa Lauffer, 86 Greene Avenue, Brooklyn; *Treasurer,* J. Halstead Patterson.

BUFFALO CAMERA CLUB—Buffalo, N. Y. Headquarters, 463 Elmwood Avenue. *President,* C. A. Pierman; *Vice-President,* Emil Strub; *Secretary,* Lester F. Davis; *Treasurer,* W. P. Hubbard.

CALIFORNIA CAMERA CLUB—San Francisco, Cal. Headquarters, 833 Market St., San Francisco, Cal. Established March 18, 1890. Incorporated April 5, 1890. Membership 337. Date of meeting second Tuesday, monthly. Monthly print exhibitions and illustrated lectures. *President,* Edward H. Kemp; *Secretary,* Wm. C. Mackintosh. Members of other clubs are cordially invited to visit our rooms when in San Francisco. Member Associated Camera Clubs of America. Salon announcements desired.

THE CAMERA CLUB—New York. Headquarters, 121 West 68th Street. Established in 1884 and incorporated in 1896 upon consolidation with the New York Camera Club, 121 West 68th Street. Membership 245. Annual meeting first Thursday after the first Monday in January. *President,* J. H. McKinley; *Secretary,* W. N. Capen. Affiliated with The Royal Photographic Society of Great Britain.

"CAMERADS"—New Brunswick, N. J. Headquarters, corner Church and George Streets. Established April 24, 1890. *Secretary,* Harvey Iredell, D.D.S., Lock Box 34, New Brunswick.

CAMERA CLUB OF CINCINNATI—Cincinnati, Ohio. Headquarters, 18 and 19 Arno Building, Fourth & Sycamore Streets. Membership 40. Meetings held on first and third Mondays of each month. *President,* Robert P. Nute; *Vice-President,* Alice F. Foster; *Secretary,* G. A. Ginter; *Treasurers,* Harry W. Greene, and Charles H. Partington. Member of Associated Camera Clubs of America.

CAMERA CLUB OF INDIANAPOLIS—Indianapolis, Ind. Headquarters, 228 E. 13th Street. Member of Associated Camera Clubs of America.

CAMERA CLUB OF THE SYRACUSE Y. M. C. A., THE. Organized December 16, 1922. Regular meeting the second Monday in each month, third floor, Y. M. C. A. *President,* E. Q. Williams; *Vice-President,* Kent C. Haven; *Treasurer,* Victor E. Kieffer; *Assistant Treasurer,* Arthur Grundmann; *Secretary,* J. O. Sprague, in care of Y. M. C. A., Syracuse, N. Y.

CAMERA CLUB OF WATERBURY—Waterbury, Conn., P. O. Box 712. Organized Sept., 1919. Meets Monday evenings at the Y. M. C. A. Room 10, 136 West Main St. *President,* Arthur H. Ganung; *Secretary,* Hollis M. French. Member Associated Camera Clubs of America.

CAMERA PICTORIALISTS OF LOS ANGELES—Los Angeles, Cal. Headquarters, 811 Washington Building. Association formed for strictly pictorial work; the holding of an annual International Salon; and for the good of the cause generally. Meeting, first Monday of month. *Director,* John C. Stick; *Secretary,* N. P. Moerdyke.

CAPE ANN CAMERA CLUB—Gloucester, Mass. Headquarters, 119 Main Street. Organized 1897. 100 limited. Membership filled. Meetings held first and third Friday each month when called. Salons, April. *President,* A. Myron Farr; *Treasurer,* Henry A. Farr; *Secretary,* Herman W. Spooner, 6 Proctor Street, Gloucester, Mass.

CAPITAL CAMERA CLUB—Washington, D. C., 1907 Pennsylvania Avenue. Founded May 1, 1891. Annual meeting, first Thursday in January. *President,* Frederick L. Pittman; *Vice-President,* N. G. Watts; *Secretary,* Rutland D. Beard, 75 The Mendota; *Treasurer,* William H. Bell; *Librarian,* Miss Lucy Powell. Date of annual exhibition, March.

CENTRAL Y. M. C. A. CAMERA CLUB—Headquarters, 1421 Arch Street, Philadelphia, Pa. Club organized 25 years ago. Meetings, third Monday in month. *President,* Bernard D. Wolff; *Vice-Presidents,* R. E. Wilson, J. F. Jackson; *Secretary-Treasurer,* S. R. C. Cooper. Membership, 62. Member Associated Camera Clubs of America.

CHAFFEY CAMERA CLUB—Ontario, Upland, Cal. Headquarters, Chaffey Library. Meetings held second Wednesday of each month, 7.30 p. m. *President,* Norban Hargrove; *Vice-President,* Francis Wagner; *Secretary-Treasurer,* Albert Salter.

CHICAGO CAMERA CLUB—Chicago, Ill. Headquarters, 31 W. Lake Street. Established February 14, 1904. Incorporated February 19, 1904. Meetings every Wednesday. *President,* Frank Farrell; *Vice-President,* Harry C. Phibbs; *Secretary,* A. C. Brace; *Treasurer,* Geo. Sohn. Member Associated Camera Clubs of America.

CHICAGO PHOTO FELLOWS—Chicago, Ill. Organized September 8, 1909. Membership, 8. *Correspondent,* F. M. Tuckerman, 1109 Railway Exchange, Chicago.

CLEVELAND PHOTOGRAPHIC SOCIETY, THE—Cleveland, Ohio. Headquarters, Rathskeller Building, E. 4th Street. Established June 7, 1923. Permanent organization effected at meeting of June 18. Incorporated October 9, 1920. Meetings every Wednesday. *Presidents,* John Steinke;

Vice-President, C. H. Shipman; *Financial Secretary*, B. E. Clarkson *Corresponding Secretary*, H. G. Cleveland; *Treasurer*, G. Y. Tange. Member Associated Camera Clubs of America.

COLUMBIA PHOTOGRAPHIC SOCIETY—Philadelphia, Pa. Headquarters, 4605 Germantown Avenue, Philadelphia. Established 1889. Incorporated July 3, 1894. Membership, 80. Business meeting first Monday of each month; other Mondays, lectures or demonstrations. Member Associated Camera Clubs of America. *President*, D. A. Adams; *Vice-President*, Frederick Toulson; *Treasurer*, Wm. J. Theis; *Secretary*, Harry Schaeffer.

DALLAS CAMERA CLUB, 1709½ Elm Street., Dallas Texas. Organized July 20, 1921. *President*, V. H. Schoffelmayer; *Vice-President*, Dr. W. H. Mathews; *Secretary*, A. M. Belsher. Regular meetings every Tuesday. Monthly competition. Membership 31.

DARTMOUTH CAMERA CLUB—Headquarters, 7-8 Robinson Hall, Hanover, N. H. Organized, 1915. Membership, 30. *President*, Geo. Rockwood. All communications addressed to Prof. Leland Griggs, Hanover, N. H. Member Associated Camera Clubs of America.

DENVER CAMERA CLUB, THE—Denver, Colo. Headquarters, Chappell House, 1300 Logan Street. Incorporated Jan. 1, 1923, with 60 members. *President* Clark Blickensderfer; *Vice-President*, James H. Hollister; *Secretary*, Harold D. Roberts, 1010 First National Bank Building, Denver; *Treasurer*, William F. Erwin. The Club is affiliated with the Denver Art Association and has its club rooms and dark rooms in the home of this association. Membership in the Denver Camera Club entitles the members to all privileges of the Art Association.

DETROIT CAMERA CLUB—Detroit, Mich. (Reincorporated, January, 1921). Club rooms, 43 Montcalm Street West. *President*, R. M. Reed; *Chairman*, H. F. Wegener; *Secretary*, M. Williams; *Treasurer*, Mrs. G. Newall; *Research and Instruction*, H. F. Barth. Member of the Associated Camera Clubs. Meetings held in the club rooms every Friday evening. Visitors welcome.

ELYSIAN CAMERA CLUB—307 Washington Street, Hoboken, N. J. Established 1902. Date of meeting second Thursday of each month. Membership 68 active. *President*, Charles A. Culp; *Vice-President*, Edwin H. Henry; *Treasurer*, George Sting; *Recording Secretary*, Paul Eickhorn; *Corresponding Secretary*, J. Henry Wendt. Member Associated Camera Clubs of America.

GRAND RAPIDS CAMERA CLUB—Grand Rapids, Mich. Member Associated Camera Clubs of America. Studio, 401 Lindquist Building, corner Ionia Avenue and Weston Street, where demonstrations and inspiration meetings are held Thursday evenings from September to June, inclusive, with occasional field days during the summer months and monthly "hikes" during the balance of the year. *President*, Raymond B. Ryan; *Vice-President*, Miss Vera Bennett; *Secretary*, A. G. Kalmbach; *Treasurer*, E. G. Brand; *Director*, Miss Fedora E. D. Brown. Annual meeting third Thursday in June.

INTERNATIONAL PHOTOGRAPHIC ASSOCIATION—San Francisco, Cal. Founded 1908. *President*, F. B. Hinman, Evergreen, Jefferson County, Colo.; *Chief Album Director*, Louis R. Murray, 927 Ford Street, Ogdensburg, N. Y.; *General Secretary*, A. E. Davies, 1327 Grove Street, Berkeley, Cal.; *Director Post Card Albums*, John Bieseman, Hemlock, Ohio; *Director Stereoscopic Division*, Lovic Meredith, Rupperttown, Tenn.; *Director Lantern Slide Division*, A. E. Davies, 1327 Grove Street, Berkeley, Cal. *Album Directors:* Eastern Division, No. 1—Under the direction of Chas. F. Rice, P. O. Box 245, Mamaroneck, N. Y., comprises New York, New Jersey, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, Delaware, Virginia, West Virginia, Kentucky, Indiana, Ohio and Michigan. Western Division, No. 2—Under the direction of P. Douglas Anderson, Room 413 Claus Spreckels Building, San Francisco, Cal., comprises California, Oregon, Washington, Idaho, Nevada, Utah, Montana, Wyoming and Colorado. Southern Division, No. 3—Under the direction of Frank Reeves, Stamford, Texas, comprises Florida, Georgia, North Carolina, South Carolina, Tennessee, Mississippi, Albama, Louisiana, Arkansas, Oklahoma, Texas, New Mexico, and Arizona. Northern Division, No. 4—As yet there has been no director named. Prints for this division should be sent to Chief Album Director Louis R. Murray, 927 Ford Street, Ogdensburg, N. Y. This division comprises Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, North Dakota and South Dakota.

KANSAS CITY CAMERA CLUB, 1923-1924—Suite 501, Bryant Building, Kansas City, Mo. Organized 1914. Club meets second Monday of each month. Annual exhibition in January. *President*, Dr. A. H. Cordier; *Vice-President*, Val. B. Mintun; *Secretary-Treasurer*, Dr. Maclay Lyon.

KODAK PARK CAMERA CLUB—Eastman Kodak Co., Kodak Park, Rochester, New York. *President*, Glenn E. Matthews; *Vice-President*, Myron V. Bacon; *Corresponding Secretary*, Mabel J. Osler; *Recording Secretary*, Anna C. Murphy; *Treasurer*, H. N. Wood. Organized Jan. 6, 1920. Regular meetings and hikes once a month.

LOWELL Y. M. C. A. CAMERA CLUB—Lowell, Mass. *Secretary,* N. R. Farnum.

MILWAUKEE CAMERA CLUB—Milwaukee Wis. Headquarters, Room 403, Tegtmeyer Building, 403 Grand Avenue. Meetings every Tuesday evening. *President,* E. J. Schaefer; *Vice-President,* B. F. Langland; *Financial Secretary and Treasurer,* Edwin F. Casper; *Secretary,* F. G. Wood, Room 606, 210 Wisconsin Street; *Librarian,* W. E. Verburgt. Member Associated Camera Clubs of America.

MOLINE Y. M. C. A. CAMERA CLUB—Headquarters, Moline, Ill.

MONTREAL AMATEUR ATHLETIC ASSOCIATION CAMERA CLUB—Montreal, Canada. Headquarters, M. A. A. A. Building, 250 Peel Street. Organized May 1, 1906. *President,* W. Gordon Wright; *Vice-President,* P. F. Calcutt; *Secretary,* P. J. B. Brass. Exhibitions: Annual, April; Provincial, November.

NEWARK CAMERA CLUB, INC.—27 Franklin Street, Newark, N. J. Organized 1888. Incorporated 1910. Meetings, second and fourth Mondays in each month. Motto, "SOMETHING OF INTEREST EVERY MONDAY NIGHT." Membership now 200 active. Member and organizer of Associated Camera Clubs of America. Visitors Welcome. *President,* Charles A. Knapp; *Vice-President,* Edward Browaski; *Secretary,* Louis F. Bucher; *Treasurer,* Edwin Wick.

NEW BRITAIN CAMERA CLUB—Organized 1892. *President,* W. B. Rossberg; *Vice-President,* E. H. Start; *Secretary-Treasurer,* Paul A. Stahl, 260 Corbin Avenue, New Britain, Conn. Meets first and third Tuesdays, 173 Main Street. Member Associated Camera Clubs of America.

NEW HAVEN CAMERA CLUB—17 Broadway. Organized 1911. Membership, 41. *President,* Frank R. Lawrence; *Vice-President,* Paul B. Hunt; *Secretary-Treasurer,* William R. Frisbie, 172 Norton Street, New Haven, Conn. Meetings held every Thursday. Business meetings, First Thursday in the month. Member Associated Camera Clubs of America.

ORANGE CAMERA CLUB—East Orange, N. J. Headquarters, Main and Clinton Streets. Established March 21, 1892. Incorporated May 19, 1893. Membership, 120. Date of meetings, first and third Saturdays of each month, except July, August and September. *President,* Richard E. Pease; *Secretary,* Ernest Williams, Main and Clinton Streets, East Orange, N. J.

OREGON CAMERA CLUB—Portland, Oregon. Headquarters, fifth floor Abington Building. Established 1895. Incorporated 1903. Membership, 100. Meetings first and last Wednesday of each month. *President,* C. W. Bernhardt; *Secretary,* W. G. Winchester. Date of annual exhibit, early in spring. Member Associated Camera Clubs of America.

PHOTOGRAPHIC CLUB OF BALTIMORE CITY—Baltimore, Md. Headquarters, Photographic Section Maryland Academy of Sciences, 105 W. Franklin Street. Established 1885. Incorporated 1890. Membership, active, 60. Meetings, second Tuesday in month. *President,* A. Gustafson, Baltimore; *Vice-President,* J. P. Jones; *Secretary,* A. H. Goldsborough, Baltimore, Member Associated Camera Clubs of America.

PHOTO FELLOWS CLUB—Vancouver, Canada. Headquarters, 650 Granville Street. *Secretary-Treasurer,* Lieut. J. Green, R. N. V. R.

PHOTOGRAPHERS' GUILD OF THE SOCIETY OF ARTS AND CRAFTS—Boston, Mass. *Dean,* Livingston Stebbins; *Secretary and Treasurer,* Ralph Osborne; *Councilors,* Mrs. Dorothy Jarvis and John Murdoch. Organized Feb. 18, 1916. Meetings held at members' studios.

PHOTO PICTORIALISTS OF CINCINNATI—Cincinnati, Ohio. Organized 1920. Work devoted to advancement of pictorial photography. Membership, six. Meetings on call only. Chas. H. Partington, director; G. A. Ginter, Robt. P. Nute, Chas. A. Weddigen, Harry W. Green, Peter Scherrer. Address communications to the director, 4113 Thirty-second Street.

PHOTOGRAPHIC SOCIETY OF PHILADELPHIA—Philadelphia, Pa. Headquarters, 1615-1617 Sansom Street. Established November, 1862. Incorporated April 24, 1885. Membership, 100. Date of meetings: Members, second Wednesday. *President,* William W. Chambers; *Secretary,* E. A. McKinley, 1615 Sansom Street; *Treasurer,* H. F. A. Starr. Date of members' annual exhibition, March. Member Associated Camera Clubs of America.

PICTORIAL PHOTOGRAPHERS OF AMERICA—New York City. Headquarters, Art Center, 65 East 56th Street. Meetings first Monday evening in each month from October to June. Officers for 1923: *President,* Dr. A. D. Chaffee; *Vice-President,* John Paul Edwards; *Hon. Vice-Presidents,* Gertrude Kasebier, Prof. Charles F. Chandler, Clarence H. White; *Recording Secretary,* G. W. Harting; *Corresponding Secretary,* Joseph R. Mason; *Assistant Corresponding Secretary,* C. Robert Myer; *Treasurer,* Sophie L. Lauffer. Member Associated Camera Clubs of America.

PICTORIAL PHOTOGRAPHIC SOCIETY OF SAN FRANCISCO, CAL.—*Director,* Anson Herrick; *Vice-Director,* L. Goetz; *Secretary-Treasurer,* G. H. S. Harding, 660 Market Street, San Francisco; *Secretary Salon Committee,* H. A. Hussey, 64 Pine Street, San Francisco.

PITTSBURGH SALON OF PHOTOGRAPHIC ART—Pittsburgh, Pa. Under auspices of Photographic Section of the Academy of Science and Art. Membership consists of the leading pictorialists in the United States. *President,* O. C. Reiter, 2424 Penn Avenue, Pittsburgh, Pa.; *Secretary,* P. F. Squier, 237 Avenue B, Westinghouse Plan, East Pittsburgh, Pa. Salon held Carnegie Institute, March. Last day of entry, February 7th.

POLYTECHNIC CAMERA CLUB—Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn, N. Y. Organized May 15, 1921. Meets second and fourth Tuesdays, 12.30 p. m. *President,* Joseph R. Fisher, 1555 74th Street; *Secretary,* Edward Breiteirser, 2703 Bainbridge Avenue, Bronx, N. Y.

PORTLAND CAMERA CLUB PHOTOGRAPHIC SECTION OF THE PORTLAND SOCIETY OF ART—Portland, Me. Headquarters, L. D. M. Sweat Memorial, Spring corner High Street. Established 1899. Membership, 105. Date of meetings every Monday evening. *President,* C. M. Jaquith, 515 Congress Street; *Vice-President,* J. Ludger Rainville, 268 Danforth Street; *Secretary and Treasurer,* E. Roy Monroe, 36 Exchange Street; *Exhibition Committee,* H. A. Peabody, 94 Pine Street; Alfred Brinkler, 104 Park Street; J. Ludger Rainville, 268 Danforth Street. Member Associated Camera Clubs of America.

POSTAL PHOTOGRAPHIC CLUB—Headquarters, Washington, D. C. Established December, 1888. Membership, 40. Date of meetings, no regular meeting. *President,* Charles E. Fairman; *Secretary,* Ernest L. Crandall, 1331 Newton Street, N. E., Brookland, Washington D. C. Albums circulate among members monthly, except August and September.

READING CAMERA CLUB—Reading, Pa. Headquarters, 610 Court Street. Established 1913. Meetings first and third Thursdays of each month. Quarterly exhibits for members only. Annual exhibit early in March. *President,* Harrison N. Mucher; *Secretary,* L. Roy Frey, 922 Hamilton Place, Wyomissing, Pa. Member Associated Camera Clubs of America.

SAN DIEGO Y. M. C. A. CAMERA CLUB—San Diego, Cal. Organized January, 1920. Headquarters, Y. M. C. A., San Diego, Cal. *President,* Homer C. Miller; *Vice-President,* I. N. Lawson, Jr.; *Treasurer,* Roland E. Schneider; *Secretary,* R. E. Vandruff. Annual exhibition in October. Member Associated Camera Clubs of America. Annual election of officers January.

SOUTHERN CALIFORNIA CAMERA CLUB (of the Southwest Museum, Inc.), 104-105 Stimson Building, 129 West 3rd Street, Los Angeles, Cal. Expect to move into new home at Southwest Museum early in 1924. Membership 100. *President,* Claude J. Williams; *Vice-President* (new one to be elected shortly); *Secretary,* R. L. van Oosting; *Treasurer,* Miss Maud Robertson. Meetings open to the public every Thursday night. Member Associated Camera Clubs of America. Second annual exhibition of Pictorial Photography from Rocky Mountain and Pacific Coast States to be held at Southwest Museum, February, 1924. Expect to make it an annual National exhibition. Monthly bulletin, the "Accelerator" will be sent free upon request. Will be pleased to receive notices of salons, exhibitions, contests, etc.

ST. LOUIS CAMERA CLUB—St. Louis, Mo. Organized February 12, 1914. Devoted to the interest and advancement of the art of photography. Meetings every first and third Thursdays at 8 p. m., Barr Branch Library, Jefferson and Lafayette Avenues. *President,* O. C. Kuehn; *Vice-President,* R. L. Jungling; *Secretary,* O. J. White, 1729 California Avenue, St. Louis, Mo. Address all communications to the secretary. Member Associated Camera Clubs of America.

SWAIN CAMERA CLUB—New Bedford, Mass. *Secretary and Treasurer,* Herbert J. Harper, 95 Walden Street, New Bedford, Mass.; *Lantern-slide and Print Director,* J. Arnold Wright, 27 Jenny-Lind Street, New Bedford, Mass. Member Associated Camera Clubs of America.

TELEPHONE CAMERA CLUB—Headquarters, 964 Sherman Avenue, New York. *Secretary,* W. J. Marshall.

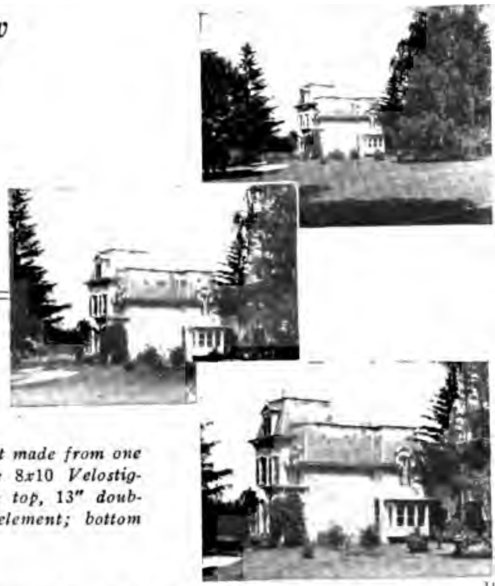
UTAH CAMERA CLUB—Salt Lake City, Utah. *President,* Geo. I. Reeves; *Secretary,* Thomas O. Sheckell, 1411 Walker Bank Building.

WASHINGTON Y. M. C. A. CAMERA CLUB—Washington, D. C. Headquarters, Central Y. M. C. A. Building. Membership, 32. *President,* Myron F. Myers; *Secretary,* Miss Elizabeth N. Brownley, 908 Que Street. N. W.

WESLEY CAMERA CLUB—Headquarters, Bell Theatre Building. Organized April 6, 1912. Meeting the first Monday of each month. *President,* Lester Lease; *Vice-President,* H. H. Flom; *Secretary and Treasurer,* W. A. Drewelow, Wesley, Iowa.

WILKES-BARRE CAMERA CLUB—Wilkes-Barre, Pa. Headquarters, 131 South Main Street. Organized 1901. Meet every Tuesday evening. *President,* James H. Prideaux; *Secretary,* Wm. Hardie Davis, 178 North Franklin Street; *Treasurer,* Albert Williams, Jr. Member Associated Camera Clubs of America.

YONKERS CAMERA CLUB—Yonkers, N. Y. Headquarters, 782 Warburton Avenue. *President,* W. R. Cronk; *Vice-President,* Wm. Beck; *Secretary,* Elijah F. Munn, 11 Van Cortland Park Avenue, Yonkers, N. Y.; *Librarian,* C. B. Carling; *Trustees,* F. W. Wocher, Wm. D. Mitchell, Geo. H. Stengel.



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10 x12	.87	4.50	8.55	1.09	5.63	10.69
11 x14	1.05	5.52	10.50	1.32	6.90	13.13
14 x17	1.58	8.25	15.75	1.99	10.35	19.69
16 x20	2.10	11.03	21.00	2.63	13.80	26.25
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3½x3½	.12		.76	.16		.96
3¼x4¼	.12		.84	.16		1.04
4 x5	.12		1.08	.16		1.36
3¼x5½	.12		1.00	.16		1.24
3⅞x5½	.12		1.08	.16		1.36
4 x6	.12		1.20	.16		1.52
5 x7	.20	$ .96	1.84	.24	$1.20	2.32
5 x8	.24	1.08	2.08	.28	1.36	2.60
6½x8½	.32	1.60	3.00	.40	2.00	3.76
8 x10	.44	2.24	4.24	.56	2.80	5.32
10 x12	.64	3.40	6.52	.80	4.28	8.16
11 x14	.80	4.20	8.00	1.00	5.24	10.00
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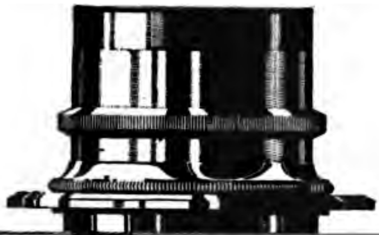

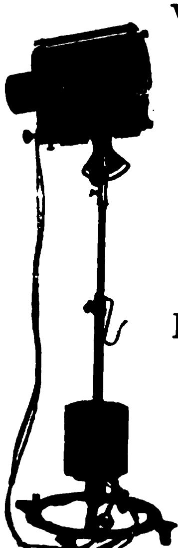

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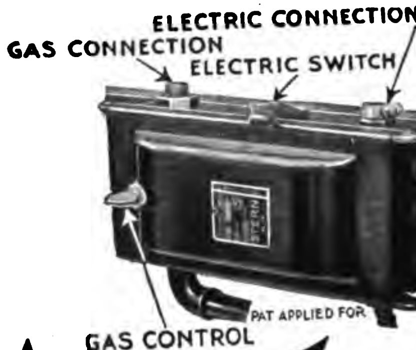

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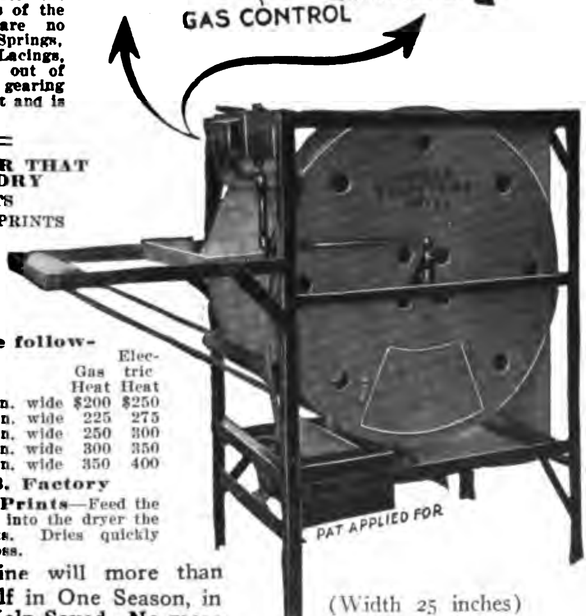

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Model 18, 18 in.	wide	$200	$250
Model 24, 24 in.	wide	225	275
Model 30, 30 in.	wide	250	300
Model 36, 36 in.	wide	300	350
Model 42, 42 in.	wide	350	400

F. O. B. Factory

For Glossy Prints—Feed the squeegee plates into the dryer the same as prints. Dries quickly with a high gloss.

This Machine will more than pay for itself in One Season, in Time and Help Saved. No more waiting for the Last Batch to Dry. It will be ready by the time the previous batch is trimmed and sorted. Its Narrow Width allows it to pass through doorways where many other dryers cannot pass.

(Send for circular with full description.)

When ordering, please state what current you use, either alternating or direct.

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